# Gas Journal

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# Editorial Notes

## Coal

THE whole country, and not least the Gas Industry with its dependence upon coal as its primary raw material, experienced great relief last week at the decision of the miners' leaders to postpone the handing in of strike notices, and the hope is universal that the postponement may give time and opportunity for removing at any rate the immediate elements of deadlock. The decision has been generally commended as one of moderation. This, of course, it is, but it is also quite certainly one of common sense, since the crisis is due in the main to an acknowledged deficiency of means to pay the miners' full wage demands, and one thing which a stoppage could not achieve would be the production of revenue. Moreover the " offers " (in which actually, as we remarked last week, there has not been much option) of the big coal consumers like the Gas Industry to submit to increases on contract prices were quite reasonably dependent in nearly all cases upon there being no stoppage, so that even the means of meeting part of the demands—to however small an extent—would automatically have disappeared if the notices had gone forward and matured.

There seems little object at the present juncture in further discussing the problems facing the coal industry. Comment there has been in plenty, including a great many futilities appearing in places which ought to know better. But reference is seldom made to the fundamental problem of potential over-production, which we discussed in some detail in our review of the whole situation on Dec. 25, and which seemed to us admirably summarized in the following extract from a leader in *The Times* of Jan. 8: " Nevertheless, the question of the size of the industry will remain. Is the industry to be organized for full-time working or part-time working? The first policy entails the closing of mines and more permanent unemployment; and the second entails chronic under-employment and higher costs of production. Both the owners and the miners show by their actions a preference for the larger industry; and it must be admitted that the State has no adequate means of providing for the thousands of men who would be made workless by the concentration of production. But one result of short-time working is now seen to be a demand for wage rates that will provide a fair standard of living for the lesser working time, and thus the costs of production are advanced again. Each policy has its price."

## Municipal Trading

No more complicated questions exist to-day than those which relate to Municipal Trading; the fact that the subject is one around which political controversy ranges does not tend to its simplification. As everybody knows there are a large number of Local Authorities which possess both electricity and gas undertakings, and it is with regard to these that our friends of the electrical Press are most commonly vocal. It is alleged frequently that in such cases electrical development is unduly, if not unfairly, stultified in order to ensure the prosperity of the gas department.

Wide generalizations of this kind are seldom re-inforced by the weight of proved facts, nor has it ever been demonstrated that the uses of electricity are less manifold in such cases than in areas where gas is free from municipal control. What then is the meaning of this charge so often repeated by certain, but by no means all, of our electrical friends? Can it imply that electricity cannot hold its own unless the activities of gas undertakings are artificially and unfairly restricted, and that Local Authorities combining the functions of gas and electricity undertakers would hesitate inequitably to foster their electricity at the expense of their gas department? We should be reluctant to endorse such a view, although the experience of certain gas companies which are in competition with municipal electricity does not favour the view that Municipal Trading is invariably fair trading.

It could scarcely be denied that the policy of those who, in another generation, empowered Local Authorities to trade in certain commodities was to ensure that the inhabitants of the area should, if they so desired, be enabled to obtain those commodities at reasonable charges. The Local Authority was, in this as in other aspects of its work, to be the servant of the community by making available amenities, which had not previously existed, in addition to those already enjoyed. Parliament was greatly concerned to ensure that local traders should not be unfairly prejudiced by competition from Local Authorities which might be rate aided. It is difficult to conceive that any exception could be taken to this simple statement of principle. Yet, until Parliament intervened in 1934, we find Local Authorites up and down the country endeavouring to force electricity upon the occupiers of their housing estates, and even in some cases threatening with eviction

any tenant who should be so bold as to use gas whether for cooking, heating, or lighting.

## York's Fight for Fair Play

We do not, however, desire to open old sores save in those cases where injustice continues, and even in such cases there is evidence that the popular love of fairplay may in the last resort prevail.

We have in former issues referred to York, and we have little doubt that the sympathy of the whole Industry is with the York Gas Company in their gallant fight against what is described in that City as "dictatorship." We repeat, only briefly, the facts. The Corporation refused permission to the Gas Company to carcass council houses during the course of their erection, although tenants of existing all-electric council houses desire to use gas, and slum dwellers to be rehoused in the new dwellings in question at present use gas, have expressed an almost unanimous wish to use gas in the new premises, and will have a legal right, upon going into occupation, to demand gas. Moreover, the carcassing would be at the expense of the Gas Company, and obviously carcassing during erection obviates damages to the structure or decoration of the houses and renders it unnecessary to break open streets after they have been surfaced, or destroy gardens which have been laid out.

It is not surprising that such arguments as these have caused widespread disapproval of the policy of the Corporation, and in an excellent leading article on the subject the *Yorkshire Herald* states that "feeling in the City is undoubtedly on the side of the Gas Company," and that "the Council are, after all, but the representatives of the ratepayers." Rumour has it that the post of many members of the Corporation has been swollen by protests, and not least with the protests of the gasworkers, many of whom no doubt share the political leanings of the majority of the Council.

It is hardly an exaggeration to state that many worthy citizens of the Ancient and Venerable City of York have been staggered to find that it has been necessary for the Gas Company to promote a Bill in Parliament in order to obtain justice. It is not surprising therefore that the matter has again been considered by the Corporation which decided, without a dissentient vote, to refer the question back to the Housing Committee in order that they might meet the Gas Company and discuss the whole matter anew.

If a satisfactory settlement is negotiated, we feel that the Gas Company will have achieved a magnificent victory not only for the Industry but for all who still cherish the ideals of democratic and representative government.

## Assurance for Peace

Even the most casual of newspaper readers can hardly fail to realize something of the significance of happenings which are being recorded almost from day to day at the present time. Though some lessons of the past may have become dim with the lapsing of the years, others all too frequently present themselves to take the places of any that have faded. So far as our own country is concerned, we are convinced that no war party exists. The nation is determined to do everything that in it lies to remain at peace with all the world. But what to do? There is more than one theory, and the different courses of action are warmly debated. There has, however, for some time past been emerging a steadily growing belief that the assurance of peace will be in strict proportion to the ability to enforce one's wishes in this respect upon a world that seems little likely to have "but a single thought." The question was in the forefront at the time of the recent election, when the soundness of the view just enunciated was admitted. So we arrive at the point that the country must be organized for defence, as the best means of preventing war in the future.

This is a matter which closely concerns the Gas Industry, whose national work during the period from 1914 to 1918 was so vitally important. From time to time speakers remind us of the vast quantities of munitions of war that were produced by the various gas undertakings, and of the numbers of men from the Industry who joined the fighting forces. What the country would have done without the help of the Gas Industry in these respects one does not know. But there was much more besides. While helping the navy and the armies in the field, the undertakings carried on with their duties to the civilian population—"kept the home fires burning"—in the face of extraordinary difficulties. Shortages in personnel and in material on the one hand vied with mounting costs on the other. In some cases, even, gas-works were "manned" by women. As these lines are penned, there lie before us pictures of women workers in London gas-works, including various retort house activities at the Vauxhall Station of the South Metropolitan Gas Company. Women during that critical period operated stoking machinery, backed-up retorts and shut doors after charging, augered ascension pipes, removed furnace covers, and acted as bricklayers' labourers while retort setting was in progress. They quenched, screened, and loaded coke, which was afterwards delivered by them with horse and van to the consumers. Women charged and discharged purifiers, attended to gas and steam engines, and did all kinds of other jobs.

This was in the past. What of the future? We are prompted to ask the question by the fact that the President of the Federation of British Industries has invited to a meeting affiliated trade associations, in order that they may carry out decisions embodied in a resolution of the Grand Council placing on record "that it is the desire of British industry to co-operate to the full with the Government in any steps that may be necessary to make good the deficiencies in the defence forces of the Crown. We imagine that the Gas Industry will subscribe without reservation to the declaration contained in this resolution, which means no more than doing again what it has done before. It is recognized by the Federation that the Government must be assured that the industries of the country can supply the Government's requirements, and that this will be done at reasonable cost; and we agree wholeheartedly with the statement "that these objects can be achieved most efficiently and most economically if the industries of the country are taken into the confidence of the Government and charged with the task of themselves setting up any organization required to meet Government needs, and of ensuring that the work is carried out on a reasonable basis of cost which shall be fair both to industry and to the Government."

The Gas Industry was not included among any that may have profited during the last war—witness the special legislation of 1916 and 1918. By the former Act, undertakings were authorized to substitute heating power for illuminating power as the standard on which their charges should be based, while the second Act—the Statutory Undertakings (Temporary Increase of Charges) Act, 1918—permitted the Board of Trade to modify the charging powers of gas companies so as to enable them to pay a dividend on their ordinary shares of three-fourths of the standard dividend or three-fourths of the pre-war dividend actually paid, whichever should be the lower. Not an excessively generous reward, it will be admitted. And we have no illusions about the effect upon the Gas Industry's purse of another similar upheaval. But what we do know is that the loyal and unselfish support of the coun-

try which was extended by the Industry on the last occasion would be fully repeated did similar demands unfortunately have to be made upon it in the future. The Gas Industry is not merely a service in time of peace; it is an insurance in time of war. It is in this way we would have it regarded by the Government and by the community at large.

## Wireless Propaganda

THE item concerning the progress of the electrical industry which found its place in one of the B.B.C. news bulletins last Thursday evening will doubtless have given many in our own Industry food for serious reflection. The fact that the work of the electrical industry is apparently judged to make acceptable " news " to millions of listeners is in itself no cause for protest on the part of gas men; nor could anyone presume to accuse the B.B.C. of unfair discrimination in the choice of its subjects, for we all appreciate that we have in the past received a certain amount of attention through the medium of the wireless. Rather does this particular broadcast seem to suggest that there is something lacking in our own organization that similar items of popular interest cannot be compiled by our Industry for the information and enlightenment of the British public. If figures of electrical activities are assumed to be worthy of transmission " over the air " to the country at large—and no one will deny that any facts which are indicative of progress in any sphere are thus worthy—so also are like facts relative to gas. Indeed, were such information readily available in " newsy " form, the B.B.C. could hardly refuse to broadcast it if they have performed a like service for electricity.

It may be argued that the Board of Trade and other Returns already provide useful pointers each year as to the development of gas; but useful as these statistics are for comparative purposes, such figures hardly provide " hot news " for the man-in-the-street. He is not interested in how much more or less capital has been expended by the Gas Industry on development, nor even that overall outputs have risen or fallen by so many millions of cubic feet. Such bare facts do not make a story; they convey very little to him. Rather is he concerned in what the Gas Industry has done for *him;* for the progress of the industries of the country towards greater prosperity; and, principally, what it proposes to do during the coming year to assist him in his home or in his business. Of such facts as these are news stories made.

It seems, therefore, that the time has arrived for the Gas Industry to co-operate in the provision, in good time each year, of information calculated to be of general interest to the public—as the electrical industry has done. Then, and only then, shall we achieve our rightful place in the news of the day; and then only shall we be able to convince the great British public of all that gas has done for them in the past and how it proposes to set about adding to their wellbeing in the future. Doubtless such procedure as this will soon come under consideration by our National Bodies concerned, and any steps taken in the matter cannot but redound to the benefit of the Industry as a whole by giving us a story which will be acceptable to the B.B.C. and the National Press alike.

While on the subject of " hot news," stress should once more be laid upon the importance of gas undertakings keeping not only their local Press, but also the B.C.G.A., well supplied with all the latest facts concerning their activities. Our local newspapers are always ready to give valuable space to any item indicative of progress in their particular districts, while the details forwarded to our Industry's Publicity Body are of great assistance to them in compiling news stories which assume a wider importance from the national viewpoint. Many undertakings already co-operate to a useful extent in this direction, but there is room for still greater effort in putting news across to the public for the benefit of all. For the little items which constitute good gas news locally in each district will help to form the nucleus of that greater story of gas progress which will go out through our National Press, and perhaps through the medium of the B.B.C. as well, as a story of real live interest to every citizen.

## Gas for Water Heating

IN this issue we conclude publication of the Paper which Mr. Leopold Friedman gave to the London and Southern District Junior Gas Association. It is a contribution of very great value on the development of the instantaneous gas water heater, and we feel sure that both the Paper and the discussion to which it gave rise will be closely and widely read—certainly to advantage. Mr. Friedman, not unnaturally, is an ardent advocate of the multi-point heater, and no one, we suggest, could put forward a better case for this class of appliance, which in all respects has been brought to a high standard of efficiency to meet modern requirements. In this standard we include performance, maintenance, and appearance. There is no question, of course, that for instantaneous water heating gas stands alone; electricity is out of the picture. As the author points out, to give a heat input of 30,000 B.Th.U. per hour—and this is only a matter of 60 cu.ft. of 500 B.Th.U. gas—a loading of 8,000 watts is needed, equivalent, at 230 volts, to about 38 amperes, which is generally not easily obtainable in the average house.

The great selling-point of gas for water heating is that there are types of appliance to meet every situation. The multi-point heater, it is generally recognized, is an excellent type covering an extensive range of usage. Its merit lies in the fact that it affords an immediate supply of hot water, and continues to give this supply as long as needed. Whether the demand be large or small, the instantaneous heater is capable of meeting it. This form of heater does, however, necessitate a flue, and, for bath purposes, the limit it imposes on the rate of flow of hot water is not fundamentally in its favour. There are many consumers who demand that a bath should be prepared with a full hot water flow from a large tap; and in practice this can only be obtained from some form of storage heater. Our view is that concentration on any one form of gas water heater would be a totally wrong policy. Many circumstances are best met by the instantaneous type; other conditions can best be met by the storage heater.

In any event the finest gas water heater can be ruined by faulty installation work; and we are very glad indeed that this was stressed at the meeting at which Mr. Friedman's Paper was given. However well an appliance may have been designed and manufactured, and whatever care is taken to ensure that it is as far as possible foolproof and has a performance sufficiently flexible to suit varying conditions, it will never be fully satisfactory unless its installation is correct. In practically all cases where there is complaint by the consumer, the fault lies not in the appliance itself, but in wrong installation. Again, there are all too many instances of first-class appliances of first-class appearance connected in a technically adequate but exceedingly ugly manner with over-conspicuous supply pipes and flue pipes. In the matter of appearance the manufacturers have set gas undertakings an example which it is their responsibility to follow. And in this connection the view was expressed at the meeting to which we refer that copper tubing is going to be one of the solutions in ensuring neat installation work. Cop-

per tubing can easily be chromium plated or finished in any other manner, including paint finishes; and to-day, one of the speakers observed, it is possible to install copper tubing throughout a house—particularly with the type of joint used for gas—at a cost comparable with, if not slightly cheaper than, steel, provided, of course, the fitter is familiar with the use of copper.

The domestic water heating load is our most promising and immediate field of development. The manufacturers have produced excellent appliances and, as we have said, of types able to satisfy any given set of conditions. To gain the load we shall have to pay a great deal more attention to installation work, and we shall have to offer gas at rates which, for equivalent service, compare with solid fuel costs. At present the water heating load represents a very small proportion of total gas sales. It will continue to do so unless attractive rates—two-part tariff or otherwise—for gas supplied for this purpose are put into force.

## Gas for Propulsion

LAST week we published the major part of a very careful and skilful analysis, by Mr. Cook, of the Fuel Research Station, of the economics of town gas, in relation to both petrol and heavy oil, as a fuel for motor transport. The dominant conclusion drawn—and it is one with which we agree—is that under present conditions the case for gas is decidedly unfavourable. Circumstances may change; but coincident with the most promising development for town gas—a special engine—is likely to be a more efficient heavy oil engine. The chief competitor of town gas is, in fact, not petrol but heavy oil. Town gas starts off with two disadvantages, the heavy weight of the equipment essential to its use and the limited range through which it can operate between re-fuelling. Suggestions have, of course, been put forward for increasing this range, the main one being enrichment of the gas; but all these suggestions, though technically easy of solution, economically have to be proved. In saying this we are thinking of the general adoption of town gas for motor transport. Even to-day there are special circumstances economically favourable to the employment of gas.

Frankly, we cannot picture the future of a wholesale use of gas in the mobile internal combustion engine in a particularly rosy light. Its limited retail possibilities by gas undertakings constitute a different matter, and in no way do we suggest that these possibilities should not be fully explored. Technically, as we have said, gas is " all there on the game "—a whip hand in emergency, in the same class as Britain's oil supply via the addition of hydrogen to coal.

Facts, however, have eventually to be faced; and we consider that Mr. Cook faces these facts squarely—which, after all, matters a great deal. Let us for a moment look at one or two of what we regard as such present facts. First, in regard to gas *versus* petrol. Here, with passenger vehicles, " double-deckers " are virtually washed out. Single-deckers present a better proposition, but here again the efforts of the National Gas Council in respect of the weight of vehicle cylinders have proved unavailing, while, with Government petting, an allowance is made in regard to electric batteries when assessing licence duties. And now we turn to goods-carrying vehicles. With these the broad conclusions are that for vehicles less than 2 tons, and where the annual mileage is about 10,000 to 12,000, compressed gas may be economic, particularly if the unladen weight on petrol is such that no additional licence duties are incurred on conversion. That for vehicles over 2 tons, the competitor to compressed gas is heavy oil; and it will be noted that in none of the cases examined by Mr. Cook can compressed gas compete with heavy oil under present conditions. Moreover, he maintains that an allowance in respect of weight of vehicle storage cylinders when assessing licence duties would not, in itself, enable compressed gas to compete with heavy oil if circumstances remain as they are. Of course, the greater the annual mileage the greater is the superiority economically of heavy oil over compressed gas.

We quote the following from the Paper under discussion: " In favourable circumstances—*i.e.*, where no additional licence duties are incurred and where compressed gas can be supplied to the vehicle at 2s. 6d. per 1,000 cu.ft., there would have to be a rise of some 1½d. to 4d. a gallon in the price of heavy oil before compressed gas could become economic for goods-carrying vehicles under present conditions. If the present additional cost of the heavy-oil engine should be halved, then the price of heavy oil would have to rise some 7d. to 10d. a gallon before compressed gas could compete." On the other hand, a rise of 2½d. to 3d. a gallon in the price of heavy oil would at present render compressed gas economic in certain favourable cases of passenger-carrying vehicles.

However, as we have said, Mr. Cook looks at the matter in a very general way, and his conclusions, important as they are, ought not to lead to reluctance on the part of gas undertakings to carry on with experiment and conversion of their own vehicles. And attention should be called to Dr. C. M. Walter's suggested use of compressed gas with a constant quantity, variable quality cycle. It is considered that such an engine, with a high compression ratio, might show a saving in fuel consumption of about 40%, which would have the double effect of reducing fuel costs and increasing the possible radius of action.

## Research in Industry

THERE is plenty of evidence in the Annual Report just published by the Department of Scientific and Industrial Research that British Industry in general is showing a growing appreciation of the value of scientific research in relation to its processes. In 1934 the Department offered to Research Associations increased Government support, and the response has been most encouraging. In the period which has elapsed since the offer was made negotiations have been completed with thirteen Research Associations, which are already assured of a 30% increase in their resources compared with those they commanded eighteen months ago. With one exception each of these Associations now enjoys an income of at least £10,000, the minimum figure accepted by the Department for the income of an Association whose future can be considered as assured. We may mention that the income of the Electrical and Allied Industries Research Association has increased in two years from £44,000 to £64,000.

In the Report of the Advisory Council is the following significant phrase: " The fact that this country has succeeded better than some others in raising herself by her own efforts from the economic depression which has affected the whole world gives her, momentarily perhaps, an opportunity of recovering some of the industrial supremacy she enjoyed until the Great War. If the opportunity is to be seized, it will require intensive application of scientific methods to all those industries which are made possible by our natural resources, our economic situation, and the skill and enterprise of our people." In regard to the " application of scientific methods " the Gas Industry has certainly taken the lead, and its success is directly traceable to this attitude. The Advisory Council of the D.S.I.R. point out that only those who habitually make use of science in the daily process of manufacture can turn new advances in knowledge to their own advantage. Here again, the strength of the

Gas Industry is largely based on its *habitual* use of science.

The Report contains summaries of the work of the various Research Boards and also of the Research Associations. We have already dealt with the activities of the Fuel Research Board, whose Report was published a short time ago, and the work of the British Refractories Research Association, as far as it affects our Industry, is well known to our readers through the Report of the Joint Committee of the Association and The Institution of Gas Engineers. Work for the Road Tar Research Committee has been in progress since February, 1934. The problems receiving attention include the adhesive properties of tar in the presence of water and the development of mechanical tests for tar aggregate mixtures. An investigation of the compression test commonly applied to cylinders of tar concrete indicates that the results obtained are not likely to give information capable of interpretation in terms of road behaviour. Methods of increasing the rate of set of tars are being examined. Another interesting piece of research which directly affects our Industry is concerned with furnace design. The engineer who wishes to work on scientific principles in designing furnaces is handicapped by lack of adequate data, particularly on radiation and convection. With the object of providing more information, work has been undertaken during the past two years in the Mechanical Engineering Department of the Imperial College of Science and Technology, with the financial assistance of the D.S.I.R. Measurements of the heat transmission from the products of combustion of town gas burned in a small furnace have been made.

## Prophetic Genius

THOSE who have no past are in many ways to be envied; they at least have no burden to bear of a consciousness, or sub-consciousness for that matter, of old sins of omission or commission. But, since the teaching of modern psychology promises great relief in many cases of suffering by the revelation to the sufferer of sub-conscious inhibitions, of which he was not aware, we ought perhaps to be grateful to our contemporary the *Gas Times* for a kindly little mark of attention in a recent issue.

In the exercise of their benevolence, they chose no less strange a partner than the *Electrical Review*, which had quoted from our issue of " Oct. 15, 1879," an excerpt containing a distinctly slighting reference to the prospects at that time of electricity in competition with gas lighting. The *Gas Times*, requoting this from their newfound ally, leave little room for doubt that we were responsible for " gas men " having taken up residence in a " fool's paradise."

It may be, now that this very grave responsibility has been revealed to our conscious mind, that we shall be better able to appreciate prophetic genius, and—perhaps—to agree with the claim of our contemporary that, had there been at the time a *Gas Times*, the future of electricity could have been clearly foreseen nearly 60 years ago, and things might have been different. Unfortunately, one definition of genius is an infinite capacity for taking pains, and it is distinctly discouraging to us to find that our contemporary failed to check-up on dates, and that there was no issue of the " JOURNAL " on the day mentioned. On the other hand, the " JOURNAL " nearest to that date contained two distinct warnings of electrical possibilities even in those very early days. Perhaps those " gas men " who are dwelling in a " fool's paradise " will have time to amuse themselves trying to find out just when we did print the paragraph which condemned the Gas Industry to a career of ruinous self-deception. On the other hand, a very large proportion of the Industry will be too busy dealing with record outputs to bother.

# PERSONAL

To fill the vacancy on the Board of the Tottenham and District Gas Company caused by the death of Thomas Goulden, Mr. CHARLES S. PRYOR, of " The Grange," Knockholt, Sevenoaks, Kent, has been elected a Director of the Company.

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The Engineer and Manager of the Bedford District Gas Company, Mr. J. B. HANSFORD, has been elected to a seat on the Board caused by the death of the Rev. Paul W. Wyatt.

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We learn that Mr. W. H. WINTRINGHAM has been appointed Chairman of the Great Grimsby Gas Company in succession to the late William Bennett, whose death is announced elsewhere in this issue.

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At a meeting of the Board of the Sheffield Gas Company held on Monday, Jan. 13, The Rt. Hon. Lord RIVERDALE OF SHEFFIELD, K.B.E., LL.D., was elected a Director of the Company to fill the vacancy on the Board caused by the death of Mr. B. G. Wood.

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We learn from a local correspondent that Mr. GEORGE BRAIDWOOD, Engineer and Manager of Coatbridge Gas Company, has been appointed to the Company's Board of Directors.

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The Rt. Hon. Lord HIRST OF WITTON, asked by the Grand Council of the Federation of British Industries to accept nomination as President of the Federation for the coming year, has agreed to do so. The Presidential year commences in April. Lord Hirst has through his Chairmanship of the Empire Committee in recent years rendered signal service to the F.B.I.

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A presentation of a walnut timepiece was made at the Penrith Gas-Works last week by the workmen and staff of the Penrith Gas Department to Mr. and Mrs. J. CORRIGAN, who have now left for Brighouse, where Mr. Corrigan has been appointed to the position of Engineer and Manager.

Mr. Peter Gunn, who made the presentation, spoke of the increases that had taken place in the output of gas since Mr. Corrigan had taken charge. Mr. F. Hodgson supported, and Mr. Corrigan suitably expressed his thanks.

The Cumberland and Westmorland Gas Managers' Association have also made a suitable presentation to Mr. Corrigan. Mr. J. E. Blundell, Engineer and Manager to the Carlisle Gas Department, spoke of the esteem in which Mr. Corrigan had been held by the neighbouring gas engineers.

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Mr. JOHN G. CUTHBERT, the Assistant Engineer and Manager of the Airdrie Gas Department, has been appointed Engineer and Manager of the Kelso Gas Company. Mr. Cuthbert was trained as a mechanical engineer in Glasgow and thereafter had service in various capacities with the Corporation Gas Department of the City. He has held his present position for 11 years and now succeeds Mr. P. R. Chalmers, whose retirement was announced recently.

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Mr. ERNEST EDWARD BIRD has been elected to a seat on the Board of the Croydon Gas Company to fill the vacancy caused by the resignation, owing to ill-health, of Mr. CHARLES HUSSEY, J.P., who had been a Director of the Company for over 45 years.

# Obituary

We regret to announce the death on Dec. 30 of Mr. WILLIAM BENNETT, Chairman of the Great Grimsby Gas Company. He had been a Director of the Company since 1895, and was Chairman and Managing Director from 1908 until his death.

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The death is announced at the age of 83 of Mr. WILLIAM HIGGS, J.P., late Managing Director and Secretary of the Basingstoke Gas Company, at Park Close, Basingstoke, on Monday, Jan. 6.

Mr. Higgs commenced his training in the Gas Industry with the Reading Gas Company in the year 1866 at the age of 14 under the late Mr. Baker. In 1874 he became an Assistant to the late W. A. Padfield, Secretary and Engineer of the Exeter Gaslight Company, and in the year 1883 was appointed Secretary and Manager of the Basingstoke Gas Company, where he served for just on 50 years.

The passing of Mr. William Higgs breaks a link in one of the oldest families in the Industry. Referring to the Year Book of The Institution of Gas Engineers it is noticed that he became a Member of the then Gas Institute in 1884.

He leaves three sons, all of whom are holding appointments with various Gas Companies. Mr. Herbert C. Higgs, Managing Director and Secretary, the Basingstoke Gas Company; Mr. Hermon G. Higgs, Works Chemist and Assistant, the Salisbury Gas Company; Mr. John Nicholls Higgs, Managing Engineer, the Swanage Gas and Electricity Company. One of his grandsons Mr. William C. Higgs, holds an appointment as a Site Representative with the Woodall-Duckham Construction Company.

The funeral took place on Thursday, Jan. 9, when a representative gathering assembled in the Methodist Church, Church Street. The chief mourners were: Mr. Herbert C. Higgs, Mr. Hermon G. Higgs, Mr. John N. Higgs (sons), Mrs. H. C. Higgs, Mrs. H. G. Higgs, Mrs. J. N. Higgs (daughters-in-law), Miss Olive Higgs (granddaughter), Miss Kinderdine, Nurse Birmingham, Miss R. M. Carter, and Mr. and Mrs. W. J. Bird. Owing to frail health Mrs. Higgs was unable to be present, and Mr. William C. Higgs (grandson), who is at present at Margate, was unavoidably prevented from attending. The staff and employees of the Basingstoke Gas Company were represented by Messrs. P. Lear, E. F. Joiner, A. Grainger, J. E. Prince, W. Stratton, R. Leadbetter, C. Newman, R. Oates, P. Barton, W. Dean, A. Dawson, C. Wright, R. Freeman, T. Hall, H. Wootton, and J. Rollinson.

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We regret to announce the death on Dec. 27 in his eightieth year of Alderman Sir JOHN MEADOWS FROST, D.L., J.P., at his residence, Upton Lawn, Chester. Sir John had a distinguished career, and belonged to a family which had taken a notable part in civic life for the greater part of a century, and who have given five Mayors to the City of Chester since 1859, Sir John holding the position of Mayor during the anxious days of the Great War. The Chester United Gas Company, of which he had been Chairman since 1912 and a Director since 1904, was one of the pioneers among industrial concerns in adopting the profit-sharing principle. Many years ago, with the warm encouragement of Sir John, the Company instituted the co-partnership system. His father became a Director of the Company in 1857, later becoming Deputy-Chairman.

# Correspondence

## "*Risk*"

SIR,—I have read with interest your comments in this week's "JOURNAL" with reference to the article in the *Glasgow Evening Citizen* on "Gas."

The article mentioned is undoubtedly "alarmist" and displays an ignorance not only of the potential risk of gas, but also of the relative risk, but I take the liberty of suggesting that your reply might be read as disparaging the unfortunate occurrences so luridly reported by the writer in question, and also of displaying a callousness which I feel sure does not exist.

To write: "Few—a very few—accidents, one or two of which proved fatal" about the results of the recent frosts infers that things were not as bad as they actually were; and surely the Gas Industry does not desire to hide the facts?

Accidents, sometimes fatal, happen in all industries, and it is easy to be indifferent when a stranger dies through one; but to anyone involved the gravity appears entirely different. Therefore it is the duty of everyone connected with the Gas Industry to recognize the potential risk and for the leaders of the Industry to point out that only by recognizing the risk and guarding against it to the utmost extent can these risks be minimized.

The Ministry of Health, by their circular 1133 of July 28, 1930, recommended that all apertures leading underground into houses should be made gas tight. The Electricity Commissioners stipulate that this shall be done. If only *one* person is gassed owing to gas entering through such an aperture, can one say that such is negligible?

One cannot prevent frost, but until every gas undertaking makes certain that leaking gas cannot enter through apertures in walls, surely the risk is not a potential risk applicable to the service, but a risk which is insufficiently guarded against; and I take the liberty of suggesting that a lead should be given to the Industry in this direction so as to remove the opportunity for journalists to indulge in lurid descriptions.

Yours, &c.,
F. B. COALES,
Director.

*Winn & Coales, Ltd.,*
*Tower House,*
40, *Trinity Square, E.C.* 3.
*Jan.* 10, 1936.

[We are, of course, in complete agreement with our correspondent that the Gas Industry must do everything possible to reduce to an absolute minimum any risk attendant on the use of gas, but we cannot think that our comment displayed callousness. Certainly any such feeling is very far removed from our mind. In this connection we would point to a significant sentence in the leader in question. After discussing the small degree of risk in relation to the service the Gas Industry renders to its millions of consumers, we said: "Which does not in the least imply that a single accident is not the grave concern of our Industry."—ED. "G.J."]

# Forthcoming Engagements

Jan.

16.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. B. Green.
16.—S.B.G.I.—Council Meeting at 2.30 p.m.
16.—B.C.G.A.—South Wales District Meeting at Cardiff.
18.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Paper by Mr. F. G. O'Neill.
18.—YORKSHIRE JUNIOR ASSOCIATION.—Meeting at Oldham. Paper by Mr. R. E. Stott.
22.—B.C.G.A.—Northern District Meeting at Newcastle-upon-Tyne.
23.—B.C.G.A.—Midland District Meeting at Birmingham.
24.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. T. A. Wolfe.
25.—WALES AND MONMOUTHSHIRE JUNIOR ASSOCIATION.—Meeting. Paper by Mr. C. F. Petersen.

Jan.

28.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m.
28.—B.C.G.A.—Manchester District Meeting at Manchester.
29.—B.C.G.A.—Yorkshire District Meeting at Leeds.
30.—B.C.G.A.—Eastern District Meeting at Cambridge.
31.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
31.—B.C.G.A.—South-Western District Meeting at Exeter.

Feb.

6.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. G. C. Pearson.
8.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Meeting at Darwen. Paper by Mr. J. A. Derbyshire.
8.—SCOTTISH WESTERN JUNIOR ASSOCIATION.—Meeting.

# News in Brief

**To Provide for Future Extensions** the Stockport Corporation Gas Committee have purchased the Portwood Iron-Works at Withens Row.

"**The Use of Gas in Dairies**" forms the subject of a recent addition to the series "A Thousand-and-One Uses for Gas" published by the B.C.G.A.

**Generous Subscriptions**, amounting to £54, have been made by the employees of the Motherwell Gas Department to infirmaries and other charitable organizations.

**By the Poor Light** of a few guttering candles the first meeting of the Dyserth Parish Council, North Wales, to be held in 1936, was conducted during a complete failure of the electricity supply which deprived the villagers of their illumination and radio.

**Among New Companies Registered** recently is Gas Appliances with a capital of £1,000 in £1 shares. One of the objects of this private Company is "to adopt an agreement with the South Metropolitan Gas Company and to manufacture gas appliances."

**By Leaps and Bounds** the sales of gas at Bedford have soared from 155 million cu.ft. in 1900 to over 422 million cu.ft. in 1935. This excellent work is shown by a graph included in "Gas Progress"—the annual bulletin of the Bedford District Gas Company.

**A Record Gas Output** was reached on Dec. 17 by the Stockport Gas Department, when the sales reached 5,013,000 cu.ft. in 24 hours, and the percentage increase since April 1 last equalled 5·53% over last year, equivalent to a total increase of 44,522,000 cu.ft.

**Self-Lighting Gas Fires for 4d. a Week**, including fixing and maintenance and a five-years' guarantee, are now being offered to their consumers by the Hastings and St. Leonards Gas Company. This special offer applies to the High "Beam" and "Portcullis" types of fire.

**A Home Service Bureau** has recently been inaugurated by the Leicester Gas Department to assist housewives in their domestic problems. Expert advice is available at all times for the benefit of consumers who are experiencing any difficulties and useful recipes and household hints are provided.

**In the Paragraph** in last week's "JOURNAL" (p. 85) relating to the works reconstruction at Salford, it has been pointed out to us that the scheme involves the addition of *sixteen* Glover-West vertical retorts of a similar (not *smaller*) type to the forty retorts which are being modernized.

**The Subscription List** in connection with the issue of £33,000 4% redeemable debenture stock, 1950-60, of the Dudley, Brierley Hill, and District Gas Company was closed five minutes after it was opened owing to the issue being considerably oversubscribed. The prospectus was advertised in our columns on Jan. 1.

**A New Issue** was approved at an extraordinary general meeting of the shareholders of the Stirling Gas Light Company on Jan. 10, when a resolution was adopted authorizing the issue of £20,000 4% new preference stock, to meet the purchase price of the Bridge of Allan Municipal Gas Undertaking, which is to be transferred to the Company on Jan. 15.

**The January Meeting** of the Eastern District of the Southern Association of Gas Engineers and Managers will be held at The Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1, on Jan. 28, at 2.30 p.m. The subject for discussion will be "The Examination of Plant and Working Conditions in many Gas Undertakings and the Lessons learned therefrom."

**A Record Year** has been enjoyed by the Blyth Gas Company, which supplies the Borough of Blyth and the urban area of Bedlington. In public lighting and the supply of its consumers the Company sent out 221,723,000 cu.ft. of gas, which represents an increase of 6,985,000 cu.ft. over the previous year's total. To manufacture this gas 12,000 tons of coal were used, all of which was secured from the neighbouring colliery of Backworth.

**Parliamentary Approval Obtained**, Stirling Gas Light Company are taking over the Bridge of Allan Municipal Gas Undertaking. The pipe line from Stirling has been joined with the gas mains in Bridge of Allan, and the order to turn on the gas will be given at an early date. The transference of the gas undertaking caused a long controversy in Bridge of Allan Town Council, but the Bill dealing with the transference went through Parliament without a hitch.

**A New Issue** of 4% preference stock is being offered by the Wandsworth and District Gas Company. This amounts to £500,000 at a price of issue of £104 10s. per £100 of stock, yielding at this price a return of £3 16s. 6d.%. Dividends on this issue will commence to accrue as from Feb. 1 next, and five months' dividend to June 30 will be paid on Sept. 1, and thereafter half-yearly. Further details of this issue will be found on another page of this week's "JOURNAL."

**The Services of Gas to Industry and Home** is the theme of an article contributed by Mr. W. H. Johns, M.I.Mech.E., Engineer and Manager of the Swansea Gas-Light Company, to a trade and industrial supplement to the *South Wales Evening Post* for Jan. 10. In the field of industry, Mr. Johns points out, scientific and commercial recognition of gas as an industrial fuel is becoming more and more general. He concludes by saying that the Gas Industry looks forward to the future with a confidence based on the solid foundation of past successes.

**An Improved System of Public Lighting** for Dublin, which is lighted both by gas and electricity, is contemplated by the Corporation, who recently passed a resolution requesting the city manager to make extra provision in the coming lighting estimates. Mrs. Maud Walsh, who moved the resolution, suggested that the Electricity Supply Board and the Dublin Gas Company be each invited to light an area so that the experts in the Lighting Department could determine which was the better luminant. The Corporation could then ask the selected Company to submit a scheme for the lighting of the whole city, the Company to provide the capital and the Corporation to pay the interest and sinking fund from income over a number of years. The suggestion was endorsed by the Lord Mayor and agreed to.

## Amalgamation and Grouping

*United Kingdom and Ramsbottom.*

We learn from a local correspondent that the offer which was made by the United Kingdom Gas Corporation, Ltd., to purchase all or part of the shares of the Ramsbottom Gas Company has been accepted by a large majority of the shareholders.

## Gas Wins the Day at Ilfracombe

### Gas Company Secure 10-Year Lighting Contract

Last week the Ilfracombe Gas Company, in face of keen electrical competition, again secured the Public Lighting contract for Ilfracombe and district. The Town Council has accepted the Company's tender for a ten-years' lighting contract, and at the same time has instructed the Company to carry out immediately a scheme of modernization and improvement of all lamps in the principal thoroughfares of the town. This was the recommendation of the Company accompanying the tender.

In addition to numerous minor improvements, it has been decided to replace forty-one of the existing 9-ft. cast-iron columns with lanterns by steel columns with suspension arms over the carriage-way, each column carrying a 6-light No. 2 cluster suspension lamp fitted with band and dish reflectors. The lanterns which will be removed are of 250 c.p., while the suspension lamps which are replacing them are of 600 c.p. The candle power in fifty-three other lamps is also to be increased from 100 to 250 c.p.

It is of interest to note that in April of last year the Company converted, at a cost of over £100, seven of the then existing lamps in the main street of the town and fixed steel columns and suspension lamps to the same specification and of the same candle power as the 41 lamps now agreed to by the Council. The seven columns and lamps were supplied, and all fitting work carried out free of all cost to the Town Council, and became the property of the Council, this being the Company's contribution to the Jubilee Celebrations of the Town. This public-spirited action on the part of the Directors of the Company has, no doubt, had a far-reaching effect, and the satisfaction which the lamps have given has been largely instrumental in influencing the Council to place the contract with the Gas Company and to further extend this system of lighting.

## The Women's Gas Council

### Brighton.

The Inaugural Meeting of the Brighton and Hove Branch of the Women's Gas Council was held on Jan. 7 in the Brighton, Hove, and Worthing Gas Company's Lecture Room in Church Street. An initial membership of over one hundred was reported, and details of a proposed comprehensive programme of lectures, socials, and educative tours were briefly outlined.

The Worthing women, through their formation of a Branch about three months ago, acted as the pioneers of the movement on the South Coast; and now the women of Brighton and Hove have followed their example.

Miss Kathleen M. Halpin, the Organizing Secretary of the Women's Gas Council in London, gave a summary of the Council's primary objects.

Mr. P. E. Browne (General Manager of the Brighton, Hove, and Worthing Gas Company), who presided over the meeting, pointed out that this new movement, formed within the Industry, would provide yet another medium for giving service to the consumer in the home.

"The Gas Industry to-day, for the first time in the hundred years of its existence, is asking the great bulk of its customers, the women of this country, to further its progress through their advice," he said.

Prior to the close of the meeting Mrs. Clowes, M.B.E., who is a pioneer of the Townswomen's Guild movement in this country and Chairman of the Sussex Federation of Guilds, was elected the branch's Chairman; Mrs. Iredale, the Gas Company's Chief Demonstrator, was elected Hon. Secretary and Treasurer.

The Brighton, Hove, and Worthing Gas Company have given the branch the use of their lecture rooms for demonstrations, talks, socials, and so on, and the members will meet each month alternately at the Brighton and Hove showrooms.

### Forthcoming Events.

### Southend.

At 3 p.m. on Tuesday, Jan. 28, a Women's Gas Council meeting will be held in the Ball Room of the Palace Hotel, Southend (Gas Light and Coke Company's area of supply), at which Mrs. Cottington-Taylor will give a talk on "My Ideal Home," to be illustrated by an entirely new series of lantern slides. The Mayoress of Southend has very kindly consented to take the Chair.

After Mrs. Cottington-Taylor's talk, Miss Halpin will address the meeting on the aims and objects of the Council.

### Downham.

The Inaugural Meeting of the Downham Branch (South Metropolitan Gas Company) of the Women's Gas Council will be held at 431, Bromley Road, Downham, on Thursday, Jan. 30, at 3 p.m.

## Belfast Breaks Records

### Heaviest Christmas Day Cooking Load

Belfast's gas output for December eclipsed all previous records. It was increased by over 33 million cu.ft., or 7·13%, as compared with the corresponding month of last year, while the record for a week's output was raised by over 10 million cu.ft., or 9·2%, and now stands at 120,915,000 cu.ft.

The most remarkable record, however, is the maximum day's output, which has exceeded last year's record by over 2 million cu.ft., or 12·5%, and has now reached 18,768,000 cu.ft. The maximum has been increasing steadily for a long number of years, but this increase is more than the total increase which has taken place during the whole of the last ten years, and it is over 20 years since such a substantial increase in any one year was registered.

The cooking load on Christmas Day was by far the heaviest ever experienced, and between the hours of 10 a.m. and 2 p.m. nearly 5 million cu.ft. of gas was sent out, an increase of 13·5% on the previous record, and equivalent to a consumption of approximately 280 tons of coal.

In a report on the subject Mr. J. D. Smith, Engineer, Manager, and Secretary, says: "In view of the greater interest that has been taken in gas labour-saving apparatus since we opened our Queen Street showrooms and modernized our Ormeau Road branch, and the consequent heavy demand for new appliances, I quite anticipated a substantially greater output of gas and had made my preparations accordingly, so that we were able to meet the additional load without any difficulty whatever."

## Record Gas Sales Last Year in Leamington

### Enormous Demand for Coke

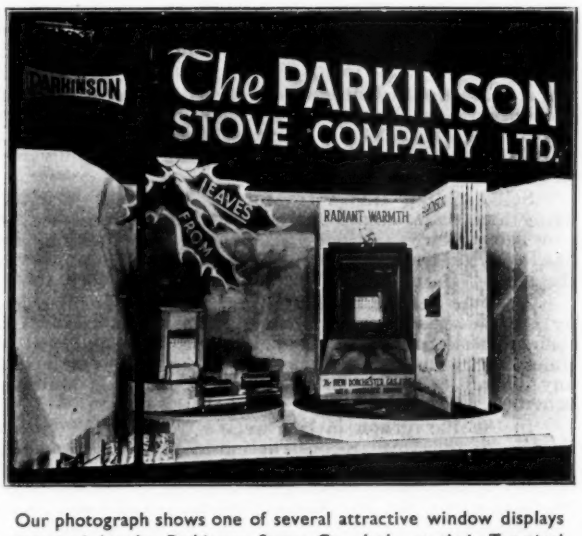
The quantity of gas used in Leamington during 1935 has been greater than in any previous year. During the short cold period before Christmas the consumption was higher than ever before; it even exceeded that of the great frost of 1929, when most people had to burn gas all night to avoid frost damage.

The maximum day's output on the Monday before Christmas Day, when there was fog and snow, was just under 2 million cu.ft., representing considerably more than the contents of all the three gasholders when full, and the coal used for making gas for Leamington for the last week in the old year amounted to 700 tons.

While the output of gas was in excess of all previous experience, the demand for graded gas coke went up by leaps and bounds.

The quantity of coke sold locally in the week preceding the holiday was over 70% in excess of that similarly sold in the corresponding week of 1934, and the local sales in the whole of 1935 exceeded the local sales in 1928 by no less than 73%.

## An Attractive Parkinson Display




Our photograph shows one of several attractive window displays arranged by the Parkinson Stove Co., Ltd., at their Terminal House Showrooms recently. The display formed a link-up with the firm's new "Radiant Warmth" gas fire booklet, and the large book in the window slowly revolved so as to show the actual appliances illustrated therein.

## New System of Gas Charges at Ramsgate

### Block Rate System Instituted

The Ramsgate Gas Department announce that as from the reading of the meters at the end of the December, 1935, quarter, the existing system of charging for gas on a flat rate with discounts was discontinued and the following block rate system instituted:

*Prices of Gas to Ordinary Consumers in the Borough of Ramsgate.*

| | |
|---|---|
| For the first 50 therms per quarter | 9·0d. per therm |
| For the next 70 ,, ,, | 8·0d. ,, |
| ,, ,, 180 ,, ,, | 7·5d. ,, |
| ,, ,, 200 ,, ,, | 7·0d. ,, |
| For all in excess of 500 therms per quarter | 6·5d. ,, |

[Subject in all cases to a discount of 5% for payment within one month.]

*Prices of Gas to Prepayment and Slot Consumers in the Borough of Ramsgate*

[These prices include the free use of two specified pieces of gas apparatus.]

| | |
|---|---|
| For the first 50 therms per quarter | 11·0d. per therm |
| For the next 70 ,, ,, | 10·0d. ,, |
| ,, ,, 180 ,, ,, | 9·5d. ,, |
| ,, ,, 200 ,, ,, | 9·0d. ,, |
| For all in excess of 500 therms per quarter | 8·5d. ,, |

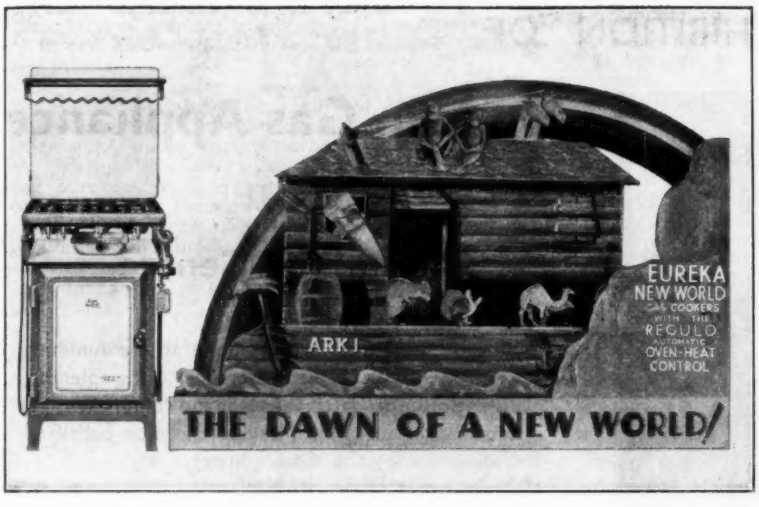
To any prepayment or slot consumer who uses a gas cooker which is his own property, the price of gas will be reduced by 1d. per therm below the above scale.

This reduction will be given in the form of a rebate:

(*a*) To slot consumers each time the meters are emptied.

(*b*) To prepayment consumers after the end of each quarter.

When instalments are due on the hire-purchase system, the rebate will be applied to reducing the amount owing.




# Novel Mechanical Window Display at Rochester

This interesting mechanical window display created a considerable amount of public attention at Rochester during Christmas week. The animals moving out of the Ark provided a ready appeal to passers-by and, as the photograph shows, it was ingeniously linked up with the Wright's "Eureka" "New World" cooker alongside.

## Calor Gas Street Lighting

Calor Gas street lighting is already in operation in two English villages, while a third is installing it this week.

Smalldole, near Steyning, Sussex, has three lamps, and Councillor D. J. Budgen states that when costs of labour, filling, &c., are taken into consideration, the new lamps are less costly than the old oil ones. Although electricity is available for the village, seven or eight more Calor Gas lamps are to be erected in one of the new residential roads there.

At Stokesley, to the south of Middlesbrough, the local Gas Company have four street lanterns in operation, this contract also having been secured against electrical competition.

Thatcham, near Newbury, is the third village.

## West of Scotland Gas Grid

### Official Enquiry Opened

We understand that an official enquiry was opened last Monday in Glasgow on behalf of the Board of Trade into the practicability of instituting a gas grid for the West of Scotland, embracing the counties of Lanarkshire, Renfrewshire, and Dumbartonshire.

The enquiry, which is being held in private, is expected to last about four days. The Chairman is Sir Alexander Walker. The firms of James Nimmo & Co., William Baird & Co., and William Dixon & Co. are directly involved in the enquiry. The scheme is considered to be one of the most important industrial projects of recent years, and strong opposition has been met from certain burghs involved, as its adoption will mean the closing down of uneconomic units.

All three companies mentioned above have projects for the setting up of up-to-date coking plant, which would effect considerable economies in the manufacture of iron and steel.

## B.S. Specification for Internal-Combustion Engines

The British Standards Institution has recently issued a new Specification, No. 649-1935, for Internal-Combustion Engines. This Specification supersedes the following British Standard Specifications, which are now withdrawn:

No. 120-1925. Gas Engines for Electrical Purposes.
No. 211-1925. Heavy-Oil Engines for Electrical Purposes, Diesel Type, Air-Injection.
No. 212-1925. Heavy-Oil Engines for Electrical Purposes, Surface-Ignition Type.
No. 213-1925. Heavy-Oil Engines for Electrical Purposes, Airless Injection, Cold-Starting Type.

These earlier Specifications were applicable only to engines for electrical purposes, whereas the present revision has been amplified to cover all internal-combustion engines (excluding those of the carburettor type) for stationary and industrial purposes and for auxiliary purposes on shipboard, and was prepared jointly by the Electrical and Mechanical Sections of the British Standards Institution.

The preparation of a British Standard Specification for Internal-Combustion Engines of the carburettor type is in hand.

The revised Specification is broadly in line with the proposals for the performance of internal-combustion engines now being considered internationally.

Copies of the revised Specification can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 2s. 2d. post free.

## A New Cannon Portable Heater

The latest production of the Cannon Iron Foundries, Ltd., of Deepfields, Staffs., is an interesting little portable gas heater, known as the "Portray." This appliance combines the attractive appearance and high efficiency of a gas fire with the high standard of combustion usually only obtained in luminous burners. A large volume of air at a moderate temperature is discharged into the apartment.

The "Portray."

The "Portray" is strongly made and pleasingly finished in coin bronze, with chromium-plated reflectors, taps, and guard. Each of the two radiants is controlled by a separate tap, though models with one and two burners are also available without taps.

This appliance provides an ideal means of heating any hall or room in which a fixed appliance is not required, being easily carried by means of the strong handle which forms an integral part of the heater-frame. The overall size of the heater is 22½ in. high by 16½ in. wide, while the full-on gas consumption is stated to be 12 cu.ft. per hour.

## The Gas Salesman's Pocket Book, 1936

### A Correction

We wish to correct a printing error which has unfortunately appeared in the Gas Salesman's Pocket Book for 1936, and which might possibly cause some confusion. Stoves, Ltd., have drawn our attention to the fact that, in inserting their revised figures, we have omitted to delete the first fourteen particulars of their "Bakerloo" cookers for 1935, so that the reference numbers 80 to 95 (the last five lines on pages 136 and 137 and the first nine lines on pages 138 and 139) are duplicated and the consumption of the grill burner is wrongly given as 17 instead of 24 cu.ft. per hour. The new revised figures begin with the tenth line on pages 138 and 139 *et seq.*

A PERMANENT EXHIBITION OF

# Modern Gas Appliances

AT THE

# Building Centre

An account of what is being done at the Building Centre, with particular reference to the splendid display of up-to-date appliances and comprehensive information bureau maintained there on behalf of the Gas Industry.

It was on the occasion of the opening, more than three years ago, that we last referred in any detail to the Building Centre at 158, New Bond Street, W. 1. At that time we mentioned that the British Commercial Gas Association, in co-operation with the Gas Light and Coke Company, had arranged a very comprehensive series of exhibits to demonstrate the considerable part that gas can play in modern house furnishing and equipment.

Great strides have been made, however, during the period which has elapsed since the launching of this venture, and about a quarter of a million people, from all over the country and abroad, have made use of its free services. So outstandingly successful has been the operation of this permanent showroom for the building industry, so great its utility, and so vastly increased its general work that the Directors have felt justified in considerably extending the floor space, a new section being opened for the first time last week.

The general remarks just made in reference to the extended activities of the Centre as a whole apply in particular to the Gas Industry Section, and those responsible for this important department have been quick to take advantage of the opportunity thus offered of enlarging the scope and utility of the gas display.

## Aims and Objects.

In order fully to appreciate the scope of the Building Centre, some reference to its aims and its methods should, perhaps, be given.

The object of the Centre is to provide facilities in one central building for manufacturers to exhibit objects and materials used in connection with buildings and their equipment; heating, lighting, and decoration.

It is open free to anyone interested in building, decoration, or equipment, either as an architect, builder, or member of the public. Every branch of the manufacturing world connected with building is represented, and it is possible to see samples of materials and equipment of every type needed to complete a building. It is not possible to purchase goods at the Building Centre, but the visitor can see what the manufacturer has to offer him in the way of new materials and new ideas, besides a very wide range of standard materials such as timbers, marbles, stones, &c.

Every exhibit is labelled with the name of the manufacturer and with a number, and visitors are handed a card on which space is provided for them to record the numbers of the exhibits in which they are interested; upon depositing the cards at the Enquiry Office they are given a series of standardized sheets giving information on the exhibits concerned. All enquiries are treated as confidential, but visitors may, if they so wish, be put into direct communication with manufacturers.

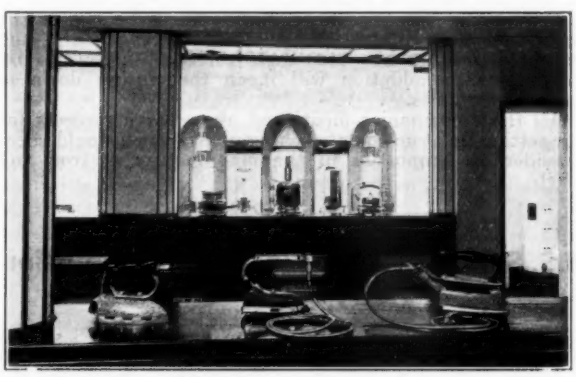
The Building Centre maintains its own staff for the purpose of giving information and assistance in connection with the exhibits, and any information given is completely unbiased, as the Centre has no direct financial interest in the sale of exhibits. No opinions, favourable or otherwise, are expressed, but as far as possible records are kept as to where various materials and objects have been used and by whom, and these records are available to enquirers, and also reports of any official tests to which various materials have been subjected.

A Library is available at the Centre for free use, and contains periodicals and magazines from all parts of the world appertaining to building and the allied arts and sciences. An up-to-date selection of the latest and standard books on architecture, building, decoration, construction, engineering, &c., both English and foreign, is available for inspection and purchase.

## The Gas Industry Section.

To turn now to that section of the Building Centre which constitutes a comprehensive and permanent domestic and commercial appliance showroom for the whole Gas Industry, we would say, without hesitation, that the re-organized display is a credit to those concerned and a remarkable tribute to the manner in which appliance manufacturers are keeping abreast of the times from every point of view.

The Gas Industry display occupies both sides of the main corridor on the ground floor, thus giving it an advantageous position from the viewpoint of attracting casual visitors or those who may not primarily be there in connection with gas appliances. Apparatus by all the leading manufacturers are neatly arranged—gas fires in a variety of pleasing finishes line each side of the corridor, while tiled alcoves on either side are devoted respectively to cooking and water heating. A particularly attractive range of cookers of many types, sizes, and finishes are shown, together with a number of "plug-in gadgets" of different kinds, and a range of three domestic size gas-operated refrigerators. The other alcove demonstrates



the different methods of heating water by gas—all the appliances being in white enamel and chromium-plated finishes. Several of the heaters discharge into a common stainless steel trough, while storage heaters and gas boilers, as well as the popular multi-point machines, are, of course, prominently displayed. A number of further examples of modern gas fires are also contained in this section, including built-in panel types. The majority of the gas fires are self-lighting, and the whole display gives expression to the modern trend for colour, artistic design, and labour saving in the home.

Close at hand is the Gas Industry Information Bureau,

where the Technical Assistant is always available to deal with any kind of enquiry involving the use of gas or gas coke. In this Information Bureau are examples of larger cooking ranges.

As the Building Centre is not interested in the sale of any particular appliance, the Technical Assistant is able to treat every enquiry on its merits and recommend the appliance most suited to the purpose for which it is required. Various appliances are connected up for demonstration purposes, while the ranges of attractive designs and finishes provide the widest choice. Though the Centre exists mainly, of course, for the benefit of architects and builders, a certain amount of business is done with chance private visitors, while house owners often call in person on the recommendation of their builders or architects.

### Private Enquiries.

In the case of a private enquiry for a gas appliance, full particulars are taken by the Technical Assistant and, if possible, a suitable appliance is recommended. The details of the enquiry are then immediately passed on to the gas undertaking in whose area the caller resides.

The Gas Information Bureau contains a number of useful technical publications in addition to a comprehensive index of appliances, thus enabling almost any kind of enquiry to be dealt with speedily. This is, of course, supplementary to the General Enquiry Bureau reference system and standardized information sheets already mentioned.

Details of all enquiries are passed on by the Technical Assistants to the Technical Manager, and suitable acknowledgment is sent to the enquirers, giving detailed particulars in regard to the matters concerned. Indeed, the Centre goes to great lengths to ensure that the fullest possible information is given to every caller on the subject in which he is interested.

Flues specially designed for use with gas appliances are to be seen at the Centre, while for those interested in central heating plant are various types of boilers actually in operation for the heating of the building. Among these are gravity-feed and magazine coke boilers.

Before concluding our review of the Gas Industry section, reference must not be omitted to the excellent window display fronting on to Bond Street, which is attracting a considerable amount of interest. This comprises one of the latest types of battery-operated automatic ignition gas fires with the radiants and fender removed. Attached to the main tap is a slowly revolving spindle actuated by a small motor, and as the tap is revolved so the gas fire is automatically lighted and extinguished, all the various mechanical parts being visible to the public. Suitably worded show-cards draw attention to this latest refinement, which renders the gas fire more and more attractive to the consumer.

When we speak of the gas display as being a *permanent* exhibition of appliances, this must not be taken too literally; for, in point of fact, as the Industry progresses and new and better appliances are introduced, so are they found a place in the display in succession to the models which they supersede.

Those responsible for arranging this splendid display are deserving of the congratulations of the Industry as a whole upon their enterprise, which cannot but redound to the advantage of gas throughout the length and breadth of the land. We understand that excellent business has resulted from the Industry's representation at the Building Centre, and its utility increases almost daily.

# AN EXHIBITION OF

# Scientific Instruments and Apparatus

**That the Gas Industry is playing its part in present-day scientific development was well illustrated by the interesting display staged by the Gas Light and Coke Company at the 26th Annual Exhibition of Scientific Instruments and Apparatus held under the auspices of the Physical Society from Jan. 7 to 9 at the Imperial College of Science and Technology.**

It may at first sight be wondered what value, commercially, a display at an exhibition of this nature can be to the Gas Industry, attracting as it does only a somewhat limited section of the community. We understand, however, that as a result of the exhibit a number of useful enquiries are received and quite an appreciable amount of business is often done. Moreover, it provides an opportunity for bringing to the notice of the scientific world the latest apparatus developed by the Industrial Section at Watson House.

The Gas Light and Coke Company's display illustrates some of the devices utilized for the automatic control of temperatures in connection with gas fired apparatus both in the laboratory and in industrial operations, together with a number of examples of small furnaces for laboratory work and for such processes as organic combustion analysis where graded temperatures are required.

### Automatic Temperature Control.

Among the temperature control devices were rod type thermostats, illustrated by sections and sectional drawings of present-day types of direct-acting thermostats. The use of these for laboratory work was shown by a drying oven with variable air circulation. An example of the mercury bulb thermostat indicated how the expansion of mercury could be utilized to close a gas valve and also actuate a pointer moving over a scale. It was demonstrated how the gas relay valve enables a gas supply of any size to be controlled by a thermostat or similar device acting upon a small weep passing only 1 or 2 cu.ft. per hour. The G.L.C. type of relay valve was exhibited.

Different types of room thermostat were shown both by practical demonstration and sectional drawings and exhibits, a new development in this direction embodying a coiled bimetallic strip which expands with the heat and produces a torsion effect upon a spindle which transmits the movement to the gas valve. Indirect-acting thermostats operating through solenoid valves were also shown.

Larger apparatus was shown for the automatic control of high temperatures—up to 1,400° C. One of these outfits, by Elliot Brothers, comprises a temperature regulator mounted on a panel, complete with two signal lamps (red and green) and an automatic motor-driven regulating valve with screwed gas connections. This regulator is intended for use with an Alchro or platinum pyrometer stem dependent on the maximum temperature which is likely to be attained. The whole equipment is suitable for operation from A.C. or D.C. mains. A regulator of this type was demonstrated in conjunction with a small gas-heated muffle furnace.

### Laboratory Appliances.

Examples of single and double tube furnaces, giving maximum temperatures up to 1,200° C. with a gas consumption of 24 cu.ft. per hour, were also shown, together with the G.L.C. still, which is stated to give an output of distilled water of 2 gallons per hour at a gas consumption of 60 cu.ft. This appliance is attractively finished in chromium-plate. The small gas-heated muffle furnace, already referred to, gives temperatures up to more than 1,200° C. and is suitable for hardening operations and laboratory work; it is complete with a pyrometer.

Together with various other small gas valves, &c., was a regulator working on the potentiometer principle and operating a motor-driven valve in the gas supply.

Of particular interest was a new design of burner (known as the Berning), recently introduced from Germany, which automatically provides its own air blast supply, thus converting it to a high-pressure burner. The air blast is produced in the foot of the burner by means of a rubber diaphragm caused to vibrate by an electro-magnet connected to the A.C. supply. This is rated at 10 watts. There should be many useful applications for this novel type of burner.

Altogether the Gas Light and Coke Company's display at this exhibition is a very interesting record of recent

developments and provides further proof—if such be necessary—that the laurels for accurate and automatic control of heating appliances do not go to any other industry.

### Other Exhibits.

Among a wide variety of controlling and recording apparatus of different types to be seen at this exhibition, there was an interesting display on the stand of Messrs. Rotherham & Sons, Ltd., of Coventry, in their range of industrial clocks developed especially for scientific apparatus work and distinguished in this respect from domestic clocks. This class of clock is a new development in this country, and is applicable for all kinds of scientific apparatus where a time unit is an essential feature. All types exhibited have rotating centre spindles and can be fitted with attachments of various sorts for carrying recording discs or drums. The usual times of rotation are one revolution in 8, 12, or 24 hours or once in 7 days.

A large range of rack and pinion movements for use in pressure or vacuum gauges of the Bourdon type was also shown by this firm, including small ones for oil pressure of the type used on car dash-boards; also larger examples for steam and hydraulic work. They are made for closed and open back type pressure gauges. There was also a small mechanical lag which obviates the uncertainty of action which is experienced when oil dash pots are used, and a larger type also for heavy switch gear work. Examples were also exhibited of lever platform escapements, the necessary governing feature for the time unit of any recording device where the time unit is of a mechanical nature. All these escapements are fitted with Elinvar hairsprings, and much of the temperature difficulty with escapements in general is eliminated.

# Laying a Gas Main

Stanton-Wilson Main, attached to timber supporting structure, suspended prior to submerging in the Forth-Clyde Canal.

## Under a Canal

An interesting example of an under-water gas main has been installed by the Corporation of Grangemouth (Stirlingshire) Gas Department under the direction of the Engineer, Mr. A. Cuthbert.

To improve the gas supply to the town of Grangemouth, a 12-in. diameter main about a mile in length had to be carried across a railway, then laid in water-logged ground, and finally installed in a trench cut in the bed of the Forth-Clyde Canal. In view of the many pipe-laying problems due to the nature of this route, Mr. Cuthbert recommended his Committee to specify Stanton spun iron pipes with Stanton-Wilson self-adjusting joints for the whole of the pipeline.

The section of the main which presented the greatest laying difficulties was that laid across the Forth-Clyde Canal, which at the point of crossing is some 60 ft. wide and about 12 ft. deep. As the canal is navigable, the pipes had to be embedded in a trench in order to avoid contact with passing vessels or their anchors. This particular section of the waterway could not be drained, and it was imperative that the laying operations should cause a minimum of inconvenience to traffic passing along the canal.

As a precautionary measure, it was decided to lay the canal pipeline in duplicate, installing the twin mains side by side in the same trench.

The trench was cut by dredging and finally trimmed to a reasonable profile by divers. Two concrete slabs were placed in position to support the Horsley syphon, which was located in the centre of and at the lowest point of each main.

It was originally intended to assemble the main—which took the form of a flat U—on the canal banks and in a vertical position. The main so erected could have been suitably slung and carried into place by floating cranes. It was found, however, that when the jibs of the available repair ships were transverse to the boats, their lifting power was insufficient to lift the assembled main, weighing over three tons.

The scheme was therefore abandoned for one in which the pipelines were assembled horizontally on punts and then lifted into the vertical position by the cranes operating over the stern of each repair ship. Under these conditions the full lifting power was available. A timber structure was constructed to support the main and so attached to the pipes as to admit their easy release when the main had been lowered into place. This structure was made strong enough to withstand all lifting stresses, which were considerable when the assembly was being hoisted from the horizontal to the vertical position. To avoid excessive overhang the end pipes were not jointed to the main until the remainder of the pipeline was partially submerged.

Plugs were fitted to each end of the mains to exclude water. The submerged weight of the pipeline was balanced by the buoyancy of the timber structure, so that when almost in position the whole assembly was just afloat. This greatly simplified the setting of the mains in their correct positions.

Before releasing the timber frame, the divers packed up each joint to its correct level.

The experience gained during the laying of the first main was used to such good effect that the second main was lowered into place in about three hours.

Throughout the work the flexible properties of the Stanton-Wilson joint proved invaluable. The joints were able to accommodate themselves to such distortion as must inevitably occur during the lifting and setting in place of mains of this type. Had rigid joints been used it would have been necessary to employ a much more elaborate and expensive method of laying to ensure a leak tight pipeline.

The mains, laid on May 21 and 22, 1935, have been transmitting gas satisfactorily at a pressure of about 6 in. water column.

# LONG SERVICE TO THE GAS INDUSTRY

A number of firms of long standing on the contracting and manufacturing side of the Industry have collaborated with the "JOURNAL" in the production of a series of articles, under the above title.

## Strachan & Henshaw, Ltd.

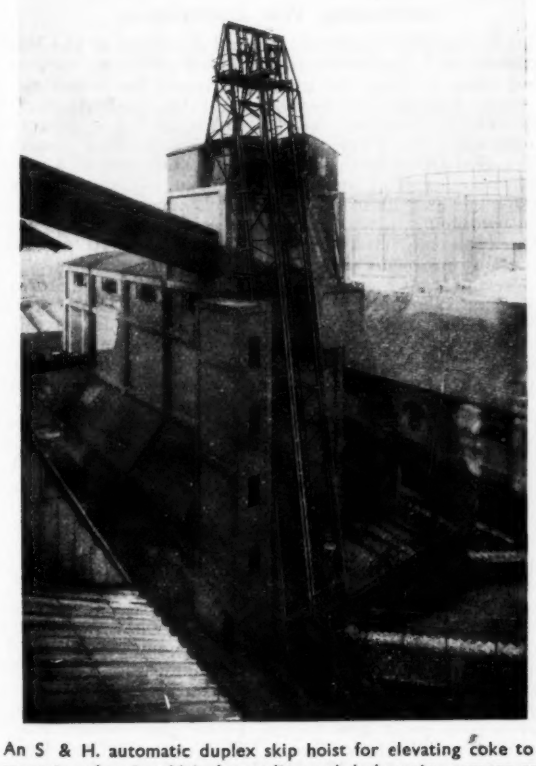
In order to ensure the most economic production of gas, it has ever been important—and has become considerably more so during the developments of recent years—to give close consideration to the method of most effectively handling, by mechanical means, the Industry's main incoming raw material—namely, coal, also its principal by-product, coke, and the oxide required in the purification of the gas. It is in this important field, as distinct from the manufacture and distribution of gas, that the old-established firm of Strachan & Henshaw, Ltd., has for many years served the Gas Industry.

The years that have passed since the formation of the Firm in the year 1879 have shown a continuous record of development both in its size and in the scope of its manufactures, which have kept pace with all modern developments on the carbonizing side of the Industry. The Firm was originally founded by Mr. R. P. Strachan and Mr. G. Henshaw in a small workshop in Long Row, Bristol, where the business of general machinists and mill-wrighting was carried on. Though small, the business prospered and in 1891 removal to more commodious premises in Lewins Mead became necessary, whence in 1893 a considerable amount of work was put out in connection with the installation of equipment in the Bristol Exhibition of that year.

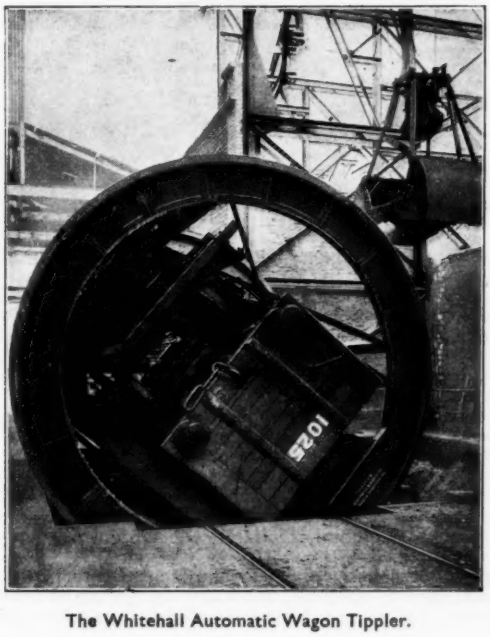
### Introduction to the Gas Industry.

Looking back it seems strange to recall that the Firm's introduction to the Gas Industry, which for many years was to absorb by far the greater part of its production, was largely due to its taking up the manufacture of parts for electric tramways; yet this was strictly the case. This work was started in the year 1896 when the electric trams were installed in Bristol—one of the first cities in this country, if not the first, to adopt this form of public transport on the overhead collector system. The Firm was entrusted with the whole of the trolley wire suspension brackets for the undertaking, and later this led to the supply of similar equipment and trolley collectors, &c., all over the country.

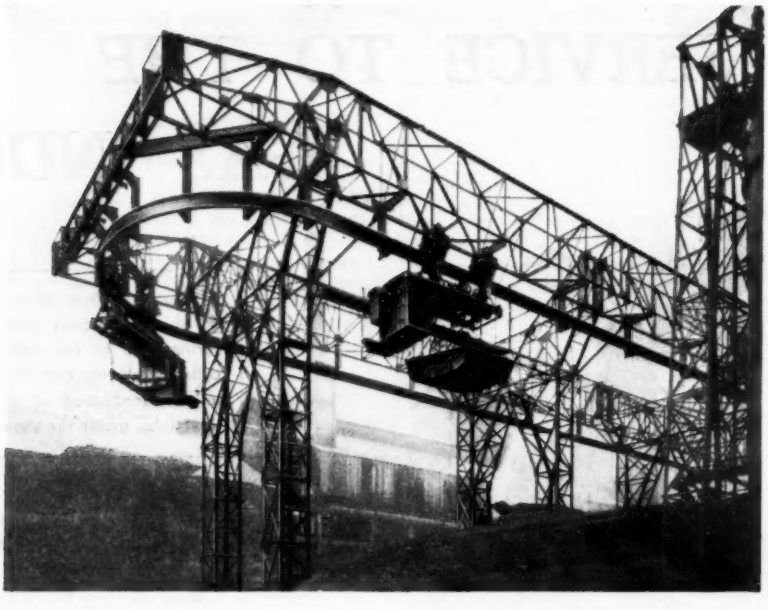
When Siemens Bros. in 1903 introduced electric telpherage into this country, the manufacture of the machines was carried out by Strachan & Henshaw, Ltd., who, in



An S & H. automatic duplex skip hoist for elevating coke to a screening plant in which the grading and de-breezing screens are of the C.C.L. type.




The Whitehall Automatic Wagon Tippler.



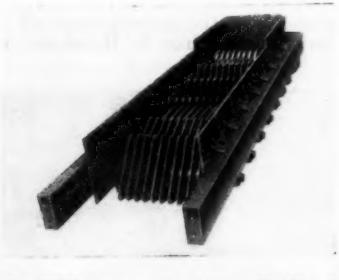
A Telpher Plant installed by Strachan & Henshaw at a London Gas-Works. The machines are of 7 tons lifting capacity, and handle coke skips from intermittent vertical chambers.

1904, took over completely the embryo telpherage business from Siemens, and can thus justly claim to have been pioneers in the development of this type of plant.

In the same year, the Firm made its second move to entirely new and much larger Works at Whitehall, Bristol. This is still the Company's principal Works and Headquarters, though considerable extensions have been carried out from time to time as expansion of business demanded, and new buildings giving an additional 13,000 sq.ft. are now under construction. The old works at Lewins Mead are still retained for dealing with general engineering work in the locality.

## The First Gas-Works Telpher.

The early telphers were, of course, very different from the present-day type of machine, and were chiefly of a very simple automatic or remote control type, with lifting capacity rarely exceeding a few hundredweights. However, the cabin-controlled machines were soon introduced, and



An example of the C.C.L screen manufactured by Strachan & Henshaw.

in 1904 the first telpher plant in a gas-works in the British Isles was installed by Messrs. Strachan & Henshaw. This was at Newport, and the machine was used for handling hot coke from horizontal retorts, a duty for which, it was at once realized, telphers were particularly well suited, in that maintenance costs were comparatively low even under the extremely arduous conditions associated with hot coke working. Telpher installations by the Firm quickly followed in gas-works at Keighley, Birmingham, Manchester, Wolverhampton, Plymouth, and, in fact, all over the British Isles, and in the succeeding years efforts were chiefly devoted to meeting the needs of the Gas Industry. The plants, however, were by no means confined to the home country, but were also installed in gas-works in such countries as Belgium, Holland, the Argentine, Australia, New Zealand, &c.

From hot coke telphers for horizontal retorts, it was a natural step to machines for handling quenched coke from verticals, and also grab machines for dealing with coal from ship, barge, wagon, &c., or for reclaiming coke from stock piles, numbers of plants of these types being installed all over the world. Attention was in due course directed to special forms of telpher plant such as the travelling bridge or transporter, including the type of bridge which carries a section of track which maintains constant contact with a fixed longitudinal track for all positions of the travelling bridge. It was also natural that the Firm's attention should be directed in early course to other types of plant associated with the handling of coal and coke, such as automatic wagon tipplers, skip hoists of all kinds, screens, and conveyors. The "Whitehall" automatic wagon tippler and the "C.C.L." coke screen, to mention only two of the Firm's productions, are now almost as well known throughout the Gas Industry as are the "S. & H." telphers.

## Interesting War Experience.

During the War years the normal activities of the Works continued to a large extent, while, in addition, they were called upon to meet the general demand for munitions in the form of shells, gun parts, &c. Telpher plants were installed in shell and explosive factories, and it is interesting to note that the Firm's unique experience was employed by the War Office in the design and installation of a special mono-rail telpher of the automatic type, capable of a speed of 75 miles per hour and used for carrying a target for aerial gunnery practice. The telpher ran on a track situated on the banks of a Scottish loch, and presented interesting problems of acceleration and retardation.

In recent years a new field for a rather special form of telpher or transporter has been opened by the increased use of intermittent vertical chambers, and plants have been erected by Strachan & Henshaw in connection with some of the largest installations of this type of carbonizing plant in the country. Generally, such telphers or transporters are used for handling the coke from the chambers to screening plant, &c., and are of a very heavy type, about 7 tons gross load, with remote control from ground level, the operator thus being free to carry out other duties such as withdrawal of coke skips from under the chambers, quenching, &c.

## Personnel.

Regarding the personnel of the Company, Mr. R. P. Strachan retired in 1920, the other founder, Mr. Henshaw having left the Company in 1900. The present Managing Director, Mr. T. Sargent, has been with the firm since 1899 and succeeded to his present position in 1926. The Mechanical Handling Plant Department was, between the years 1910 and 1927, under the control of Mr. Herbert Blyth, whose untimely death in December of the latter year was a great loss to the Firm, and robbed the Industry of a well-known figure. The control of the Department then passed to Mr. G. W. Grossmith, who was subsequently appointed a Director in 1934.

# The Poor Box

**By Northumbrian**

Much has been written—and much spoken—upon the subject of a hefty rebate for prepayment consumers. I do not propose, however, to produce a further dissertation upon the theme—rather a little by-product.

In prefacing a delightful work, J. K. J., of cherished memory, once said, " it would not elevate a cow." In so far as gas science is concerned, this, in the matter of elevations, is in the same category. But we, here, do return a big " discount " to prepayment users—the outcome of successive price reductions. We preferred to allow the old meter setting to stand, so that now we have in sight enough to meet cooker rentals and the innumerable small ledger accounts for globes, mantles, and so forth, continually sent for with the message " please take it off the dividend." (Co-operative Societies are strong hereabouts!) We should not otherwise be able to do this quite large business, and we do not mind all the labour it involves for such small items and small amounts for a large clientele. To put it on the lowest level, if there is anything in the " personal element " in business, we are handsomely repaid. Looking rather higher than this worldly view, the slot meter discount has given us a bond, which we cherish with something akin to affection, with the private lives of our consumers—their joys and their sorrows, their frailties and their strength.

The fact is that, from the consumer's point of view, the meter has become a veritable savings bank. We have even been asked to empty a meter because the lady had seen a bargain pair of trousers in a local window—three and eleven if you will have it—and she wanted the cash to enable her to secure the bargain ere it was too late. We assisted her to achieve her object and trust the husband received a pleasant surprise.

Many requests, however, present a totally different aspect, and the following, chosen from a large batch of letters in the writer's possession, indicate perhaps something of what the gas meter poor box has meant to some in times of distress. The reader can rest assured that not by any means the most harrowing tales have been selected:

> Will you please send someone up to take the money out of the meter I would like to go and see my brother who is dangerously ill in ——— Hospital and this is visiting day I have not a penny in the world as I have no one working so would be much obliged to you if you would send some one up I can get in any time I got this letter what I am sending you down to see so you can see he is very ill hoping you will oblidge me

> Would you mind sending a man up to take the money out of the meter my husband has got a day or to work and I have not got anything for them to come home to I had some work to go to but I have had Plursy and flu and I am still very weak you have always been kind at letting a man come up I had nothing of the boy or girl at the week end as they have both been ill with flu so dear Sir I would be more than thankful to you if you could send some one up before 4 oclock so I could get something for them to eat the lad will see when he comes up I have nothing in the cupboard so will trust on your kindness to oblidge

> Would you please send a man up to empty the meter I asked you last week I would not ask you if I was not desperate I have only 23/- to keep 4 of us and I have been in bed 10 days with Plursy and before I pay rent and coal and insurance and light I have hardly any thing left to live. I will get a pay off the boy this week he has been off a week with flu so he has to work a fortnight before he gets a pay we can hardly hear the money drop in the meter as I have been burning it night and day and the gas men tell me I burn more than some that has a griller I hope you wont refuse me and you have never refused me in 21 years I want to buy a bit of flour to bake a bit of bread and get a bit of something for the boy coming from work as he is so hungry with walking to N——— and I feel when I cannot give it to him so will you please oblidge me with sending a man up tomorrow tuesday.

Although for a considerable time the writer entertained suspicions regarding the genuineness of much of these, joy-bus-trips being a popular attraction, he has reason to believe that very much of it is genuine—so much so that to a small extent Santa Claus, like many gas men, has recently had a little extra duty thrust upon him.

# Ascot Gas Water Heaters' Annual Party

The annual party of the employees of Ascot Gas Water Heaters, Ltd., was held on Dec. 20. The party was arranged by the Management of the firm, assisted by the Ascot Sports and Social Club, and staff and guests, about 700 in all, were entertained at the Porchester Hall, Bayswater, which provided a splendid setting for the occasion. At the entrance each lady guest was presented by the Management with two Christmas gifts.

In the centre of the hall a large Christmas tree was set up, to which all the guests brought gifts. These were tied to the tree and presented to the Willesden Hospital.

Gifts of a silver tray, silver cigar lighter, travelling clock, and leather-bound notebook and diary were made by the staff to the Managing Director, Dr. Bernard Friedman, who, in his acknowledgment, paid tribute to the efforts of the staff and remarked that the achievement of the firm during the year was due to their loyal and industrious service. The success was due to the wonderful spirit born, bred, and cultivated by the Ascot Sports and Social Club, run entirely by the workers.

Our photograph shows those present at this enjoyable function.

# PRACTICAL ASPECTS OF
# Instantaneous Water Heating by Gas

by
**LEOPOLD FRIEDMAN,**
Chief Engineer, Technical Department,
Ascot Gas Water Heaters, Ltd.

From a Paper read before the London and Southern District Junior Gas Association on Dec. 13, in which the Author makes particular reference to the essential requirements to be observed in the design and construction of this class of heater.

(*Concluded from p. 98 of last week's issue.*)

## Multi-Point Gas Water Heaters as Auxiliaries and as Alternative Hot Water Systems.

It is correct to say that gas as a fuel for heating water cannot as yet compete with coke and coal so far as price is concerned. But in these days, when labour saving is of such importance in the small house or flat, gas has its obvious advantages over solid fuels.

In spite of the fact that gas as a fuel for heating water is, even with suitable two part tariffs, somewhat more expensive than coal or coke, there is a very large market open for gas water heaters as an alternative to a coke-fired boiler because of the advantages of the former as a standby for summer months, when a coke boiler may make the house uncomfortably hot.

Although an instantaneous gas water heater can be used as a booster for a coke or back boiler, it has been our experience that there is no demand for this system and that what is required is an independent instantaneous supply of hot water which can be obtained when the temperature of the water supply from the boiler is too low, or

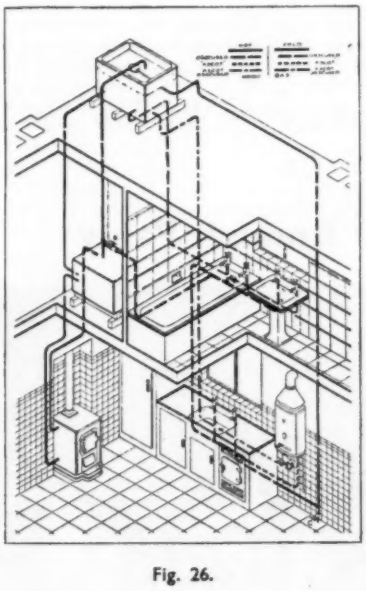


Fig. 26.

when the boiler is temporarily out of use. Fig. 26 shows the correct principle of installing an instantaneous gas water heater as an alternative system by using the same water pipes. All that is necessary to put the gas water heater into operation is to open valve "A" and close valve "B." With an installation using a secondary return it is necessary to insert two valves in the hot water system. The points to be carefully checked when installing an instantaneous gas water heater as an alternative system are:

(1) The gas water-heater should be connected to the tank supply and not to the main.
(2) The gas water heater must at all times be isolated from the boiler system.
(3) The expansion pipe must at all times be left open.
(4) The expansion pipe must be isolated from the heater or slow closing of the gas valve may result.
(5) All pipe sizes must be carefully checked so that the head of water available at the highest hot water point is sufficient to overcome the resistances of the system to give the required water flow.

## Instantaneous Gas Water Heaters Connected in Parallel, Supplying the Same Hot Water System.

Another interesting application for instantaneous gas water heaters for which there is a certain scope is for a hot water system where the demand for quantities of hot water varies considerably. A system has been developed whereby heaters can be used connected in parallel, the number of units in operation at any one time being dependent on the quantity of hot water required. Fig. 27 shows the operation of this system. 31*a*, 31*b*, 31*c*, and 31*d* are four instantaneous gas water heaters connected to common hot and cold water supplies, 7 and 2 respectively. 32*a*, 32*b*, 32*c*, and 32*d* are the automatic valves which operate the gas valves as soon as sufficient water is being drawn off. When a quantity of water in excess of the capacity of the first heater is drawn, a pressure difference sufficient to deflect the diaphragm (4*b*) is set up on two sides of the restrictor (9*a*). This opens the water valve (3*b*) and allows water to flow through the heater (31*b*), thereby bringing it into operation. If the demand for hot water is again increased, heater (31*c*) similarly comes into operation, and so on.

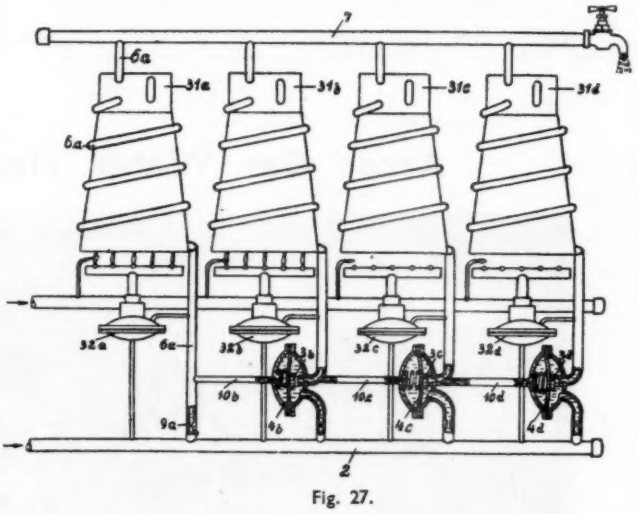



Fig. 27.

## Accessibility and Easy Maintenance.

It has been stressed throughout this Paper that progress in the general construction of instantaneous gas water heaters has tended towards sectionalization to facilitate maintenance, and the desirability of this has led to the following general method of construction. The component parts of the heater may be classified as follows:

(1) Outer shell, consisting of back and front shells.
(2) Draught diverter.
(3) Heating body and heat exchanger.
(4) Gas section.
(5) Burner.
(6) Water section.
(7) Back plate.

This general layout has led to the alteration in the shape of the appliance, making it possible to fix the appliance directly to the wall, thereby saving space and making the installation unobtrusive as well as dispensing with the bracket usually necessary with the old type "geyser." Also, the ugly shapes associated with old type heaters have now given place to modern, more æsthetic designs.

The various components of modern gas water heaters are complete units, and the removal of any one is a matter of a few minutes. Although gas water heaters are designed for a life of ten to fifteen years, this period is based on the assumption that the appliance will receive proper and adequate servicing. Maintenance plays an important part in the life of a gas appliance, and it is satisfactory to know that gas undertakings are realizing that it pays to keep a staff of experienced service engineers to inspect water heaters installed on their districts, especially where the appliances are installed on simple hire.

Although, as has been shown, manufacturers of gas water heaters should design their appliances with a view to making servicing and installation as simple as possible, yet, owing to the tendency towards completely automatic operation the appliances themselves have of necessity become more complicated and require a degree of skill and technical knowledge which is above the standards prevalent some years ago. It is gratifying to know that steps are being taken to instruct gas fitters and others concerned with gas supply in the details of scientifically designed apparatus.

In servicing, attention should be paid to the following points:

(1) Heating body dismantled and washed out.
(2) Water section dismantled and washed out.
(3) Burner and burner tray cleaned.
(4) Heating body de-scaled. The frequency of this depends on the hardness of water, the amount of use, and the temperatures employed, and should be carried out when found necessary on maintenance visits by reduction of water flow, efficiency, residual heat, &c.
(5) The heating body and heat exchanger should be retinned and the heating element lead coated when this is required. The frequency of this will depend on the treatment the appliance has received, and under normal domestic conditions this should not be necessary under five years.
(6) After re-assembly, the gas and water rates should be carefully checked.

Dismantling can be performed with ease, and with the method of construction mentioned, servicing the heater should only take half an hour.

Our experience has led us to a conclusion similar to that expressed by Mr. T. G. Noble, when he states:

> "Although there are many effective scale removing preparations on the market, mechanical removal of scale has some merits. While I do not think that it is desirable to design all appliances so that chemical descaling is unnecessary, there are obvious advantages in providing means of partial direct access to the interior, if only for visual inspection whenever possible. . . ."

To facilitate de-scaling, the bends on the heating element are made detachable in the larger type of appliances.

## Materials.

Until comparatively recently, gas water heaters were manufactured entirely of copper, but with the introduction of sectionalized design and the development of the pressed steel industry, and consequently reduction in the cost of manufacture, the materials generally used for gas water heaters are now sheet steel for the outer shell, back plate, and draught diverter, copper for the heating body and coils, and brass for the burner and gas and water sections. Heavily tinned iron and steel have been used for the heating body and heat exchanger in those countries where the price of copper is high.

## Appearance.

When one compares the poor design of the old type "geyser" with the clean lines and smart appearance of the modern gas water heater, one is not surprised that the "geyser" was regarded as a makeshift. In this respect public taste has aided the manufacturer inasmuch as the Victorian and Edwardian ideas of elaborate decoration has given place to more functional conception, with the result that simpler and neater designs are now favoured by the general public. Up to the time when vitreous enamel was introduced, copper, with its corrodibility and the labour entailed in keeping it clean, was usually used for the outside finish. Since that time, however, vitreous enamel, which requires very little labour to clean, has been adopted as standard for up-to-date appliances.

The introduction of the outer shell as a separate unit aided the manufacturer in designing a heater which would give a neat appearance and harmonize with the simplicity of modern decoration. Although it is possible to obtain vitreous enamel in various colours, it is not very widely used owing to the difficulty in matching exactly the surrounding scheme of decoration. White, being neutral, is adopted, as it does not clash with any colour scheme.

Chromium plating has also aided in bringing the gas water heater into line with modern taste, and manufacturers of high-grade appliances have adopted it as a standard finish for all small external metal fittings, such as taps, unions, &c., while nickel plating is used for the metal parts contained within the outer shell.

## District Research.

A considerable amount of research has been carried out over many years in laboratories and valuable experience gained whereby appliances have been developed in accordance with the theory of design and subjected to tests under conditions corresponding as closely as possible to those found on the district. It has been found necessary, however, to undertake investigations of actual installations on the district, and district research on over five thousand appliances has been carried out, and special report forms have been completed, giving full details of each appliance and installation.

From these researches, which extend over the whole country, it has been found possible to form conclusions on a number of points. These may be classified generally as follows:

(1) General factors affecting installation.
(2) Factors affecting the design, material, and construction of appliances.

## Factors Affecting Installation.

However well an appliance may have been designed and manufactured, and whatever care is taken to ensure that it is, so far as possible, foolproof and possesses a performance sufficiently flexible to suit varying conditions, it will never be fully satisfactory unless the installation is correct.

It has been found, for example, that although it is usual to design instantaneous multi-point gas water heaters for their possible connection directly to the main water supply, this method should be avoided wherever possible and an appliance capable of operation with a low pressure water supply from a tank should be utilized. Water undertakings are not bound in any way to maintain a constant water pressure, and in many cases the pressure variations are such that accurate regulation of the appliance is nullified. With single point appliances controlled by a tap fitted to the heater itself, this is of no great importance, but multi-point appliances which are operated from distant taps require under such adverse conditions a degree of adjustment not to be expected from the average consumer without some education in the manipulation of taps. Although it has been found possible to educate the consumer to this standard, the difficulty should be entirely overcome by utilizing a tank feed.

The commonest faults found in installations are the lack of a sufficient head of water to overcome the resistance of pipes and fittings, resulting in an inadequate flow of water; the use of gas and water pipes which are of too small a diameter in relation to their length; the use of unsuitable pipes and fittings; the presence of dirt, filings, &c., in water pipes which should have been flushed out and in gas pipes which should have been blown through before connection. District research has also shown a very serious lack of appreciation of flue problems with the frequently haphazard use of patent fittings which are thought to be a panacea, although no such claim had originally been made for them by their inventors.

No further reference, however, to this aspect of the situation will be made, as it is proposed to publish results in considerable detail at a later date.

It may be of interest here to consider briefly the question of head of water in relation to frictional resistance. While it is possible to design an appliance which will operate with a low minimum head—*e.g.*, 3 ft. without pipes and fittings being connected—the actual head of water for operation must be sufficient to overcome the added pressure loss due to the resistance of the pipes and fittings. We have found that the use of copper pipes and fittings is of material assistance in this.

Additional allowances must be made, of course, for bends, elbows, tees, stop-cocks, and draw-off taps.

It has been suggested that light gauge copper tubing for domestic installations is definitely preferred by those

mechanics who have used it, on account of its cleanliness and the ease with which a neat and attractive installation can be carried out. At the same time, the labour involved is considerably less. Furthermore, the use of copper gives a smooth external surface, and, what is more important, smooth bore, free from leaks and less susceptible to scaling than iron pipe, and without the mechanical weakness inherent in lead.

At one time certain water authorities insisted that if an instantaneous multi-point gas water heater were connected directly to the main water supply, a reflux valve should be fitted in order to prevent the possibility of any water syphoning back from the appliance. It was found, however, that such reflux valves had moving parts in water and that comparatively rapid corrosion occurred, with the result that the valve stuck. As a result of this, water authorities generally have withdrawn this stipulation.

### Factors Affecting the Design, Material, and Construction of Appliances.

A factor which plays an extremely important part is that of accessibility. It is considered essential that every appliance should be provided with a water filter, water throttle, drain plug, gas throttle, pilot throttle, &c., and in some instances an adjustable ignition control is also desirable. Such controls must be readily accessible to the fitter but not accessible to the consumer. Again, the whole appliance should be capable of being quickly and easily dismantled for cleaning purposes, and yet designed in such a way that it is not possible to re-assemble incorrectly, or that if wrong assembly is possible the effect will be that no gas will be available at the burner.

To take a case in point, the history of the use of stuffing boxes may be of interest. Many early designs show that the stuffing box was not accessible, and no provision was made for the indication of a leakage. Subsequently indicating tubes were provided to show a leakage when it occurred, but little or no provision was made for accessibility. Of more modern design is a stuffing box which is fully accessible, provided with a leakage indicator, and with a knurled screw for tightening the packing in order to stop a leakage. This, however, proved unsatisfactory, as in many cases the knurled screw provided was tightened unnecessarily, with the result that the friction between the packing and the push-rod bearing plate was too great, giving both slow opening of the gas valve and, what was worse, slow closing.

This stuffing box was also easy to re-pack, but it must be remembered that in any gas water heater fitted with an automatic valve the friction between the push-rod and the packing should be as low as possible, and the stuffing box must be carefully tested so that the push-rod will move under a certain pressure.

The modern stuffing box is, therefore, not capable of being easily re-packed, but is provided with a means of indicating when a leak is present in order that it may be replaced, and is spring loaded to allow for wear.

It was also found that the materials used for certain components, while quite satisfactory under normal conditions, failed when the appliance was overloaded or neglected on the district. The fact that district water pressures might be so low as to be barely sufficient to fill a storage tank, or, again, might be over 200 lb. per sq.in., has had a considerable influence upon the testing of materials, and upon design to eliminate noise at points where the water under high pressure is forced at high velocity past sharp angles and through narrow orifices.

In addition to the inspection of installations on the district, a very careful record and analysis is kept of all appliances or components returned to the Works. In cases of a component part, such as a heating body or a water section, being returned, the component is built into a complete heater and tested thoroughly. From the analysis of these reports, together with the collected results of district research and laboratory experience, the appliance is developed upon the most progressive lines to give the utmost satisfaction.

### Conclusion.

It will be seen that the instantaneous gas water heater has changed from the somewhat crude job it used to be and has progressed through a series of stages until a reasonable degree of perfection has been attained. The changes in design have not been so much provoked by scientific research, but have been in no small measure the result of practical necessity and competition.

It is only in recent times that the whole question of gas utilization, and especially research into the problems connected with instantaneous gas water heaters, has been tackled on scientific lines, and to my mind the real technical developments in these appliances will be realized during the next few years.

Some of the inventions mentioned in the course of this Paper open great possibilities for entirely new designs of valves, heat exchangers, &c., and break away from ideas, some of which have persisted for many years.

## Discussion.

The PRESIDENT (Mr. J. M. Webber, of Croydon), in opening the discussion, remarked that Mr. Friedman had given them a most interesting and comprehensive Paper on water heaters. It was in some respects a Paper for the specialist, and he was therefore glad to see so many gas water heating experts with them that evening.

Mr. C. A. MASTERMAN (Gas Light and Coke Company) said that Mr. Friedman was sincerely to be congratulated upon his most interesting survey of the intelligent and scientific development of a gas appliance—a development which had extended over a long period of years. It was interesting to remember that as an offshoot from this development there came the creation of a new and now familiar type of aeroplane, a matter which might be a surprise to some of them, although the technique was less far remote than would at first appear.

There could be no sensible controversy over statements of fact, and there were few statements in Mr. Friedman's Paper which he would care to challenge. Among the few, however, there was one, where the Author had said that gas as a fuel for heating water could not as yet compete with coke or coal so far as price was concerned, even with suitable two-part tariffs. Despite the great potential importance to the Gas Industry of the water heating load, Mr. Masterman estimated that at the present time it represented less than 10% of their gas sales. Any considerable development of this load was therefore likely to rank to a large extent as additional gas consumption, and therefore represented to the consumer gas charged at the lower of the two rates where a two-part tariff was in operation. He was certainly familiar with charges under such schemes under which he estimated that for equivalent service gas would certainly be no more expensive than solid fuel for water heating. They would note that he said "equivalent service," and he would stress this because in practice one was liable to find that the very convenience of automatic hot water service led the consumer to use more hot water, and, naturally, in these circumstances the fuel charge was proportionately increased.

Correspondence between the charge for gas or solid fuel for water heating could not be derived from bench efficiency tests, although even there the gas water heater showed a high efficiency, but was rather the result of the high operating efficiency of gas as compared with less flexible and automatic fuels.

It was fair to claim in general that with an appropriate gas installation every gallon of hot water drawn represented about 2 cu.ft. of gas of 500 calorific value, and proportionally for gases of other calorific values. No such assurance was possible with solid fuel where the inevitable excess of heat must run to waste or the consumer be troubled with inadequate hot water supplies.

### Central Systems.

In blocks of flats attempts had been made to overcome the inevitable inefficiency of the small solid fuel hot water systems by central systems for the whole block, the water being distributed from a large central boiler. This enabled a relatively high boiler efficiency to be maintained, but the heat losses between this boiler and the tap were also inevitably high. Since it was difficult to meter this hot water satisfactorily to the consumer, it was usually reckoned in with the rent so that responsibility for economy was no longer felt and considerable waste usage usually resulted. By distributing the gas directly to each flat for the automatic preparation of hot water in the flat, no heat wastage occurred *en route* and the usage was measured on the gas meter.

It would be unfair to suggest that the appliance which they used to know as the "geyser" was the only appliance for the preparation of hot water; but often it was the most compact and simplest to install, and deserved a high degree of popularity. Its chief drawback lay in the limit which it imposed on the rate of water flow, utmost luxury demanding that a bath should be prepared with a full hot water flow from a large tap. Such a result could, of course, only be obtained in practice from some form of storage heater. Such storage heaters required a greater knowledge and a higher technique in installation than the non-storage type with which Mr. Friedman was primarily concerned.

The Author had stressed the attention which had been paid during the last few years to appearance and finish, and the undertakings and consumers owed a debt of gratitude to the appliance makers for the revolutionary improvements which had been made in this respect during latter years. He felt, therefore, that especial responsibility now rested on gas undertakings to ensure that the installation was up to the standard of the appliance itself. They were still familiar with the sight in consumers' premises of a first-class appliance of first-class appearance connected in a technically adequate but extremely ugly way with over-conspicuous supply pipes and flue pipes. In this matter of appearance the appliance makers had undoubtedly set the undertakings an example which it was their responsibility to follow.

In respect of the domestic consumer there could be little

doubt that the water heating load represented their most promising and immediate field of development, and that by developing this load they could render a great service to their consumers and at the same time see a great expansion in gas sales.

## Importance of Correct Installation.

Mr. R. N. LeFevre (Gas Light and Coke Company) remarked that he had had possibly more than average experience of multi-point heaters, particularly in regard to their installation and servicing. He was especially impressed with Mr. Friedman's observation that however well an appliance might have been designed and manufactured, and whatever care was taken to ensure that it was, so far as possible, foolproof and possessed a performance sufficiently flexible to suit varying conditions, it would never be fully satisfactory unless the installation was correct. If he might make a minor criticism it was that, in Mr. LeFevre's opinion, the Author had not sufficiently stressed this need for perfect installation. Mr. LeFevre had from time to time been called in to attend to complaints, and in hardly any cases—possibly in none at all—had he discovered any fault in the appliance itself, its design, or in the materials. In practically every instance it had been due to faulty installation. A most common fault to-day—even after five years' experience of the modern type of heater—was that the head required to operate the valve was usually assumed to be the pressure at the valve of the heater rather than the pressure at the draw-off tap. The important factor was the head of water available to give the requisite rate of flow at the highest or smallest draw-off tap. If the flow of water at the highest draw-off tap was sufficient one could be sure that the valve would work satisfactorily. He would suggest that those concerned with estimating should work on these lines, in which case they would save much subsequent trouble. Mr. LeFevre said that he was interested in the improved type of fixed venturi with the additional sliding valve, and he urged them all to examine this valve, as many of their minor troubles due to sticky venturi pipes would be overcome by its adoption, while, in addition, it facilitated the fixing of a heater where the head of water was the barest minimum.

He was glad that Mr. Friedman had mentioned the use of copper tubing. This was going to be one of the solutions of their difficulty on the score of neatness. It would give no trouble in operation or cause dirty water. It could easily be chromium plated or finished in any other manner, including paint finishes. It was easy to apply a coat of white enamel in order to render the pipes similar in appearance to the high standard of the appliance itself. Those who were still fitting water heaters with lead pipes would be well advised to consider the use of copper pipes for this work.

In common with Mr. Masterman, he did not agree with the Author in regard to the relative costs of gas and other fuels for water heating. With a two-part tariff and gas at 4d. per therm they could give a proper hot water service at a cost which could compete successfully with coke or any fuel.

## The Use of Copper Pipes.

Mr. S. F. Dunkley (Gas Light and Coke Company) remarked that he had been endeavouring to find out from builders the reason for the tremendous increase generally in the use of copper tubes. It could not in their case be a question of costs because practically all builders used what appeared to-day to be an expensive joint which must keep the cost of installation above the cost of similar installations in wrought iron or steel. It was interesting to note that the new Atlantic giant, the "Queen Mary," was, he understood, being largely piped with copper tubing for hydraulic, steam, and water services. That being so, it seemed strange that the Gas Industry had not been quicker in taking up the question. As they might have learnt, it was possible to-day to install copper tubing throughout the house, particularly if they adopted the more familiar type of joint used with gas, at a cost comparable with, if not slightly cheaper than, steel, provided, of course, the fitter was familiar with its use and had had some experience with it. Mr. Friedman had drawn attention to the chief advantages of copper tubing, but he omitted to mention the greatly increased strength of copper at high temperatures as compared with lead. They had all experienced the failure of lead in many instances due to decreased section as a result of bad manipulation in installation. In such cases there was a likelihood of failure at high temperatures. Water undertakings, in addition, were in favour of copper installations.

Mr. J. Ewart (Ewart & Son, Ltd.) remarked that he was under the impression that multi-point gas water heaters were in use in this country prior to 1900. Before the introduction of the multi-point pressure type there was a non-pressure type in existence, a single-point bath water heater with an automatic ball valve in the feed tank on the top of the appliance It had, of course, to be fixed above the level of the taps. Mr. Friedman had referred to an automatic valve which he had stated was not operated by a spring but closed under its own weight. In point of fact, said Mr. Ewart, this valve was fitted with a rubber tube and it shut down under the reaction of this. In regard to baffles, he observed that in some of the earlier types of heaters—thirty or forty years ago—these were incorporated in the top of the heater, not in the form of perforations, but in the form of discs or baffle plates. This was given up and a separate baffle made. The tendency now was for the baffle to be part and parcel of the apparatus.

## A Scientific Approach.

Mr. T. G. Noble (Gas Light and Coke Company) added his thanks to Mr. Friedman for presenting them with so excellent and comprehensive an account of the stages in the development of the particular types of water heater with which he was associated. To those of them who were engaged on work—which was in many respects similar and certainly very closely related—on behalf of various gas undertakings it was indeed encouraging to find increasing evidence of the appreciation by manufacturers of the value of a scientific approach to the problems of the Industry so far as they affected the design of appliance and the subsequent elimination of such faults as might have been overlooked in the initial design or could only be detected by careful observation of the long-period behaviour of the appliance on the district.

He had been privileged to discuss the problems of gas water heaters with Mr. Friedman on many occasions, and while, as he knew, they were not agreed on all aspects, especially the value of the gas storage heater and circulator to the public and the Industry, Mr. Noble might say that, essentially, he could heartily endorse the remarks in the Paper concerning the design of heaters of the instantaneous type. If therefore he mentioned only some points on which they appeared to differ he was sure he and those present would realize that his intention was not merely to be destructively critical, but to avoid a boring reiteration of what Mr. Friedman had already said.

He would start with one point which might appear small but was not without significance. Mr. Friedman suggested that change in design had not been so much provoked by scientific research, but had been in no small measure the result of practical necessity and competition. In other words, research had not provoked sales, but the need to sell had provoked research. That, he thought, was an under-estimate of the value of pure research to industry generally—of which Mr. Friedman's appliances gave an admirable example. As he pointed out, they were ultimately based on the work of Osborne, Reynolds, and other workers in the field of fluid flow who were certainly not interested in selling gas. Other examples would occur to them readily—he would mention only the name of Faraday, who was sufficiently misguided to assist their most modern competitors! Incidentally, while he was referring to the great ones of the past, he felt that Mr. Friedman had (unintentionally) overlooked the work of some of the founders of instantaneous gas water heating in this country in his reference to the introduction of the use of diaphragms for automatic valves. For example, a gentleman named Winterflood, who he believed was at the time associated with those old allies of the Gas Industry, Messrs. Ewart, certainly patented a diaphragm valve as long ago as 1895. He was not, of course, suggesting that modern valves employing diaphragms did not represent a very great advance on the older types.

He would also draw attention to some remarks Mr. Friedman made on the subject of burner design. The statement that in a gas water heater "flames should not impinge on any cold solid surface" should obviously only refer to luminous flames—unless they were to reject the wash-boiler and that most regrettably popular of water heating systems—the kettle on the gas ring! He thought that Mr. Friedman over-emphasized the merits of the pin-hole as opposed to flat flame burners. He was personally satisfied with the pin-hole burner as a sound type in practice, but so, too, was the flat flame for many purposes. He was sure Mr. Friedman and himself both knew of cases where rat-tail flames had impinged on cold surfaces, and personally he had not found it a very difficult matter to get a satisfactory heat distribution or avoid flame chilling with the flat flame types. Certainly the latter were more suitable for thermostatically controlled storage appliances where a very low by-pass rate spread over many pinhole jets gave an unstable flame. Of course, in such a case a complete cut-out of main gas and re-ignition by a pilot was possible with a snap action thermostat, though so far as he knew it had not been used. Mr. Friedman also stated that pin-hole burners were "useless" in a condensing appliance. Mr. Noble suggested that it all depended on the design of appliance—so long as condensate did not drop on the burner (and this could be arranged and was preferably so even for batswing flames) there was no real reason for his proposed restriction.

## The Sectionalized Fin.

The approximation to ideal conditions given by the sectionalized fin was very clearly illustrated, and he would be interested to know how far this was attained in practice, and whether Mr. Friedman regarded the effect as of prime importance in design or rather as a method of securing a slightly more compact appliance, possibly at the expense of some complication in the manufacturing process. Mr. Noble emphasized Mr. Friedman's remark on the many advantages from the consumers' and the Industry's point of view, and asked if Mr. Friedman experienced any difficulty with the volume governor due to the partial blocking of some jets and consequent lengthening of others since the gas rate was kept constant. The advantages of a reliable volume governor were many, and this appeared a possible and even likely disadvantage. Incidentally, he thought Mr. Friedman would agree that the theoretical difficulty with sink heaters referred to in the Paper was in practice relatively unimportant.

He felt that Mr. Friedman rather underestimated the possibilities of automatic temperature control for instantaneous heaters when he stated that they were an unnecessary complication, though until the price was right it might be true that

there was no market for them in England. Certainly the gravest disadvantage of the instantaneous heater at present was the fact that it was not *fully* automatic in so far as the consumer had to adjust the temperature himself—and this adjustment was liable to be upset to an annoying extent by variation in water pressure—a defect from which the storage heater was free, though it might have other drawbacks for some situations.

Finally, Mr. Noble drew Mr. Friedman's attention to the fact that his commendation of the A.G.A. recommendation for flueless appliances would lead to the exclusion of flueless sink non-storage heaters in rooms of less than 1,000 cu.ft. capacity—a restriction quite unnecessary for such appliances.

## A Case for the Storage Heater.

Mr. F. BRINSLEY (Radiation, Ltd.) associated himself with the complimentary remarks which had been made in regard to the Paper. The present tendency was very noticeable—and had been so for some time—for the Gas Industry to concentrate upon the high-power instantaneous water heater at the expense of the storage type of heater. It had even been suggested that the low maximum consumption type of heater should be discouraged. The reason for this had been stated to be the competition they received with this type of heater from the electrical industry. But Mr. Brinsley suggested that to recede from such a challenge indicated a lack of resolution and he could not believe that the young men of the Gas Industry to-day would accept such advice. From that point of view, said Mr. Brinsley, one might remind oneself of the present position of the lighting load and take warning from past experience in that field. There were indications of a swing back to the storage type of heater, and he thought that this was due to the fuller realization of the advantages of the low maximum consumption principle, which possessed unique advantages over other principles. In the first place there was no flue, and Mr. Friedman had indicated in his Paper the difficulties which arose in connection with flues, while many of them knew how frequently in practice one found it impossible to fix a flue or the frequency, at any rate, with which difficulties were met with in fitting a satisfactory flue. The low maximum consumption heater was the complete answer to this problem.

Moreover, the latter type of heater enabled one to state the maximum running cost, and he would suggest that this was becoming a more and more important matter. Recent advertisements in connection with electrical water heating stressed the fact that the running cost could be guaranteed not to exceed a certain stated figure. Finally, the low maximum consumption heater required only a small supply pipe and a similarly small demand upon the meter and the gas mains. Mr. Brinsley was convinced that the Gas Industry would rue the day if they failed to make use of an appliance possessing such outstanding advantages.

Mr. W. R. K. BRAUNHOLTZ (Institution of Gas Engineers) also paid tribute to the value of Mr. Friedman's Paper.

Mr. W. L. WESTBROOK (North Middlesex) remarked that he understood that there had been some difficulty in regard to deposits dropping on to the grid and stopping free egress of the products as well as interfering with the travel of the gas. Mr. Friedman's measuring point was in the centre of the baffler, but he suggested that any products of combustion likely to escape would rather be found in increased quantities at the edge of the baffler. He had often found when testing these appliances that while there was no indication of any escape under the edge of the canopy one did get considerable quantities at the far side. The automatic draught diverter was very interesting, said Mr. Westbrook, and he could appreciate the reason which had given rise to this invention. One of the greatest drawbacks to the use of this type of gas appliance was getting rid of the products of combustion, and in the case of flats they had no alternative but to take the flues outside on to the walls. In certain weather conditions a large percentage of the products of combustion were forced back into the rooms, and if it happened to be the kitchen it made that room uninhabitable. This was where the low consumption heater came in; they all knew of its drawbacks in respect of its limited output per hour, but it definitely overcame most of the flue troubles.

Mr. J. GRAYSTON (Lea Bridge) said that they must realize that there was a great body of artisan consumers whose total family income did not permit of their using gas for the provision of hot water. They must look forward to the day when the Industry's coke market would be entirely domestic. The average consumer required hot water all day long, and by utilizing coke, room heating was obtained as well. So far as water heating was concerned, Mr. Grayston considered that it was a matter for gas *and* coke.

## The Author's Reply.

Mr. FRIEDMAN, in reply to Mr. C. A. Masterman, while agreeing that the introduction of two-part tariffs was likely to be of material assistance in reducing the difference in cost between water heating by gas and water heating by coke, expressed his opinion that the time was somewhat early to estimate the results of the new system in actual practice. In this connection it was interesting to note that not more than twenty of the gas undertakings in the United Kingdom had introduced a two-part tariff and that the introduction was comparatively recent. At the same time he wished to take this opportunity to welcome the introduction of two-part tariffs as a distinct advance in the furtherance of the utilization of gas for the heating of water.

With regard to the use of large central hot water systems for blocks of flats, it would appear that such installations would form a very useful criterion in comparing relative costs of gas and coke where two-part tariffs were in operation. It should also be considered that de-centralization of hot water supplies was of the greatest importance from the point of view of cost, and that the running costs of individual instantaneous gas water heaters installed in each flat would be cheaper than those incurred by a large central heating installation. It gave him very great pleasure to note the stress which Mr. Masterman had laid upon the point that the installation should be up to the standard of the appliance itself, and he wished to express his sincere appreciation of the efforts made in this direction by gas undertakings. The question of installation had been developed further by Mr. R. N. LeFevre, and it was most gratifying to learn that so much emphasis had been given to this point.

His thanks were also due to Mr. LeFevre for raising a point which, as a representative of a firm of appliance manufacturers, he considered to be of importance—*i.e.*, that difficulties were experienced more often on account of faulty installation or regulation than with the appliance itself. With reference to Mr. LeFevre's remarks concerning the importance of ensuring that there was sufficient head available at the highest draw-off tap, he would like to mention that a special example was being prepared for publication in the forthcoming edition of "Notes on Physics and Chemistry of Heating Water by Gas-Fired Appliances," giving calculations of head of water required with a normal installation.

His thanks were due not only to Mr. LeFevre but also to Mr. Dunkley for emphasizing the advantages of copper for pipes and fittings, which had been only lightly touched upon in the Paper. This question was one on which Mr. Dunkley had considerable knowledge and experience. Reference had been made in the Paper to a booklet entitled "Copper for Gas and Water Installations," which Mr. Dunkley had written on the subject, and it was to be hoped that this booklet would be widely read.

He was particularly interested in the comments which Mr. J. Ewart had made. It was perfectly true that multi-point heaters were used in this country prior to 1900; the firm which the Author represented, had been manufacturing multi-point heaters since 1895, and some of these appliances were still in operation in this country. While thanking Mr. Ewart for this correction, he would mention, however, that although multi-point gas water heaters had existed for a considerable period of time, their use had not become popular until some few years ago.

## Positive Closing of Valves.

He wished to apologize for the statement that the automatic valve, illustrated in the Paper, closed under its own weight and not by a spring, and it was interesting to note that the spring had been replaced by rubber. This was not mentioned in the source from which the Author derived his information, but he felt that such a method of ensuring the quick and positive closing of a gas valve was not as satisfactory as the use of a suitable spring of incorrodible material. It was quite true that attempts had been made to utilize baffles in the form of discs or baffle plates at a very early date, but it was interesting to note that the actual application of these designs was very short-lived on account of the fact that they were quite unsuitable and did not perform the threefold function required of an efficient draught diverter. It was essential to realize that the products of combustion should not in any way be "baffled," but that it was necessary to incorporate means of neutralizing the effects of pull, static, and back draught, on the combustion of the appliance, and not rely upon additional fittings which, however carefully designed, had no relation to the output, efficiency, flue-temperature, &c., of the heater to which they were fitted.

It might also be of interest to note that the originators of the idea of incorporating such a device as an integral part of an instantaneous water heater, had designed the draught diverter in such a way as not only to ensure the maintenance of good combustion standards in all circumstances, but also to facilitate accessibility. In this connection he would refer to Patent No. 315,396 of January, 1930, which described how the whole of the appliance could be dismantled without having to disconnect the flue pipe or interfere with the flue installation in any way.

He was grateful to Mr. T. G. Noble for the kind remarks he had made, and he likewise advocated the necessity for mutual co-operation and research between the manufacturer and the gas undertakings.

Mr. Friedman wished to state that he was fully conversant with the name of Mr. Winterflood, who seems to have been prolific in the number of his designs. As far as he could ascertain, the earlier ones would appear to have been generally of the plunger or piston types, and it was also possible to trace a diaphragm valve which was not evolved until the beginning of the present century. This was definitely of the pierced diaphragm type referred to in the Paper, and bore no relation in principle to the diaphragm now familiar in modern automatic valves, which formed a continuous wall separating two housings in which water was present at different pressures when a flow was established. He wished to thank Mr. Noble for drawing attention to this point, and to take this opportunity of removing any misunderstanding which might exist by stating that the type of diaphragm introduced by Dr. Friedman was definitely one which was not pierced and which was capable of being used with pressure-proof distributing appliances con-

trolled by distant taps, and that the movement of this type of diaphragm was obtained by the development of a pressure difference due to water flow through an independent venturi tube.

## Flame Contact.

On the question of burners, he admitted that the section on burners might have been more clearly expressed and that the use of the bunsen burner had not been emphasized, as this type of burner was not generally suitable for use in gas water heaters using town gas. The use of bunsen burners with flame contact in gas fires, rings, &c., was well known, and it was very far from the Author's intention to imply that flame contact under such conditions was undesirable. He agreed with Mr. Noble that the flat-flame burner possessed distinct merits when used with storage appliances, circulating boilers, &c., where the number of burners for a given combustion space was comparatively small and a standby flame of appreciable size had to be maintained. Mr. Friedman was glad to hear that Mr. Noble agreed that the pin-hole type of burner was most satisfactory in the case of an instantaneous gas water heater. It was also interesting to note that numerous experiments had been made with this type of burner, and the results obtained did not appear to justify any alteration of the pin-hole burner.

He would like to emphasize that the design of a sectionalized heat exchanger was of the utmost importance from the point of view of the length of life of the appliance and the elimination of excessive oxidation and corrosion. An additional advantage was that the amount of material required was reduced, and it was found that the incorporation of these advantages enabled a more compact design to be achieved. The advantages of this system were fully explained in the Paper.

Mr. Noble had enquired whether difficulty had been experienced with the volume governor by the partial blocking of the burner jets, and Mr. Friedman was able to reply that no such difficulty had been encountered for a period of over two years of normal domestic use without service. The blocking of the jets could only be caused by incorrect cleaning of the burner, the correct process being described in the Paper.

With regard to the question of automatic temperature control for instantaneous water heaters, Mr. Friedman felt that this might be a disadvantage, as it was desirable to vary the temperature of water to get the correct temperatures required. At the sink and perhaps at the lavatory basin in the bathroom very hot water was essential, whereas to fill the bath, wash the hands, &c., water of a much lower temperature met the purpose. This might be obtained with instantaneous water heaters quite easily by altering the flow of water, whereas with an automatic temperature control this would necessitate the use of mixing taps. Mixing taps not only increased the cost of the installation, but together with the water governor generally used in conjunction with automatic temperature control would increase water pressure losses to such an extent as to render it unsuitable for tank supply, and the current water regulations forbade the use of mixing taps with an appliance connected directly to the main water supply.

In giving the recommendation of the A.G.A. he had not intended to suggest that this was applicable to the conditions found in this country, but only as an indication of what was being done in the United States, where conditions for ventilation were very different from those obtaining here. At the same time he considered that the principle given indicated a useful line of approach to the subject, although some modification was desirable in the actual figures involved.

## The Storage Water Heater.

While Mr. Friedman fully appreciated the case for the storage heater set forth by Mr. Brinsley, it appeared to him that this contribution to the discussion did not appear to apply so much to the present Paper as to the one given in 1932 by Dr. Bernard Friedman and subsequently presented in booklet form, under the title of "Fundamental Principles of Water Heating by Gas." It was quite true that there was a tendency among manufacturers of storage gas water heaters to emphasize possible distribution difficulties. He quoted from "Fundamental Principles of Water Heating by Gas": ". . . Admittedly, and making a virtue of necessity, in the past it has been necessary to advocate their use: for considerations such as inadequate and obsolete service pipes, or the difficulty or impossibility of providing a flue outlet, the desire to avoid larger and more costly meters, or the idea of a level load (so much esteemed by electricity undertakings)—these, and similar considerations may, in a measure, have been responsible for the extended use of the storage appliance. To-day, however, it is imperative to consider the consumer's point of view, and to make his complete satisfaction the first and ultimate objective. Certainly the storage system has its uses for specific purposes, as, for instance, where the circumstances are such that the requirements for hot water are limited to one or two baths, and free space in the kitchen or scullery is ample, or where for some reason or other, only a storage appliance can be installed. In this case, a gas storage water heater is suitable. Generally, the primary concern of a consumer putting in a hot water appliance is undoubtedly to obtain hot water in abundance, to have it available at any moment, and to have it supplied in the most economical way, by a fool-proof appliance. The one appliance that meets this need is the instantaneous gas water heater. . . ."

It was not possible to agree with Mr. Brinsley's implication that to retreat from the challenge of the electrical industry by not producing gas storage water heaters showed a lack of resolution. Indeed, in view of the remarks contained in the *Electrical Times* of Oct. 18, 1934, it appeared that the resolution could better be expressed by concentrating upon the type of appliance to which their electrical competitors could give no effective answer. The expression of the electrical point of view given in the *Electrical Times* was as follows:

> "A stimulating factor, the importance of which should not be overlooked, is competition from gas. In its efforts to produce apparatus that is the gas counterpart of electrical equipment, the Gas Industry has given very widespread publicity to the principle of thermal storage heating. The more the general public becomes familiarized with heat storage as a system, the easier it becomes for electrical salesmen to convince them of the advantages of electricity as the heating medium. It is to be hoped that the Gas Industry will continue and intensify its propaganda for thermal storage, for our mutual benefit."

Mr. Friedman regretted that he could not endorse the statement made by Mr. Brinsley that with the low maximum consumption heater it would be possible to state the exact running costs. This was by no means clear, as with any gas storage water heating system a large percentage of the running cost would consist in the maintenance consumption required to keep the water hot, or to maintain the temperature of the water against heat losses in the flue ways of the heater and at other points. This heat loss and consequent cost varied tremendously from heater to heater and installation to installation, and would always depend upon the "efficiency of use," which varied from case to case. On the other hand, in the instantaneous type of appliance only the water actually used was paid for, and it was possible to make an accurate estimate of the running cost in terms of gallons of water raised through a certain temperature for the price of a therm of gas. This was possible in view of the fact that with the instantaneous type of water heater the overall efficiency was constant and did not depend upon efficiency of use. He again quoted from the above-mentioned publication "Fundamental Principles of Water Heating by Gas": ". . . The possible objections to any form of storage waterheater are the definite limitation of the amount of hot water stored, and the time required to obtain a fresh supply of hot water. The smaller sizes (10 gallons capacity) are just about adequate to supply one bath, while the larger sizes are capable of supplying two consecutive baths. Of course, it is possible to install an appliance—and there are such appliances—which could supply more baths, but the space such heaters occupy is, in many circumstances, an objection to their use.

"Bathing, as a rule, takes place during certain limited periods, and where several baths are required within a certain time, the storage system may fail, for the simple reason that the available hot water is not sufficient to go round.

"This inconvenience is, of course, mitigated in the case of the quick-recovery type of gas storage water heater. Where electricity is used, the difficulty is not so easily overcome, owing to the increased loading troubles. To give a heat input of 30,000 B.Th.U.'s per hour, a loading of 8,800 watts is required, equivalent, at 230 volts, to about 38 amp., which is generally not easily obtainable in the average house.

"With a quick recovery storage gas water heater, the chief advantage of the low consumption heater—namely, the absence of a flue pipe—is lost. . . ."

## Flue Difficulties.

Both Mr. Brinsley and Mr. Westbrook stressed the difficulty of obtaining a satisfactory flue installation. Mr. Friedman felt, however, that the difficulty was due principally to the building and plumbing contractors not being familiar with the principles involved; no difficulty was experienced with installations carried out by gas fitters.

Mr. Westbrook raised a point that some difficulty had been experienced through deposits dropping on to the grid. In a well-designed instantaneous gas water heater with satisfactory flue installation there was no possibility of deposits dropping upon the heat exchanger, although deposits due to corrosion would form in the heat-exchanger and would be removed periodically. As mentioned in the course of the Paper, the question of blocking the drillings of the burner grid had already been dealt with in the reply to the point raised by Mr. Noble. In the case of the block of flats, it was quite possible to obtain perfect and satisfactory flue installations without difficulty and at reasonable cost.

The Author expressed his agreement with Mr. Grayson that one must not overlook the fact that an instantaneous water heater working in conjunction with a coke boiler was definitely the ideal system, and in this connection he particularly wished to refer to the section in the Paper entitled "Multi-Point Gas Water Heaters as Auxiliaries and as Alternative Hot Water Systems."

## Vote of Thanks.

A hearty vote of thanks to Mr. Friedman for his Paper was accorded on the proposition of Mr. R. SUMMERSON (Luton), Senior Vice-President, seconded by Mr. LEFEVRE, Junior Vice-President, and duly acknowledged by the AUTHOR.

# Woodall-Duckham Work in 1935

## A Year of Record Activity

In 1935 the Woodall-Duckham Company has experienced a year of record activity. The total value of orders received has exceeded the corresponding figure for any previous year. The total capacity of carbonizing plants ordered during the year was over 2,075,000 tons per annum, or some 25% greater than in any other year. The Company also starts the year 1936 with a greater volume of constructional work in hand than has ever before been experienced, for the plants under construction have an annual capacity of over 2,830,000 tons of coal.

Orders for the erection of new installations of Woodall-Duckham continuous vertical retorts have been received from the Gas Undertakings in the following places: Birmingham (9th installation: Windsor Street Works), 591 tons per day; Ilkeston, 65 tons per day; Loughborough, 42 tons per day; Elgin (2nd installation), 12½ tons per day; Rhyl (2nd installation), 20 tons per day; Algiers (N. Africa), 213 tons per day; Bari (Italy), 25 tons per day; and Naples (Italy), 248 tons per day. The last three orders were, of course, obtained by the Italian Associates of the Cie. Gle. de Construction de Fours.

In many cases where a plant has, after many years of continuous operation, completed its useful life, it has been found desirable to carry out a complete reconstruction embodying retorts of the latest modern upwardly-heated design rather than either to rebuild it on the former lines or to erect a completely new installation. Orders for modernization schemes of this type have been received from Margate, 111 tons per day; Aberdeen, 163 tons per day; Wolverhampton, 161 tons per day; Walsall, 190 tons per day; Liverpool, 207 tons per day; Dundee, 234 tons per day; and Nottingham, 194 tons per day.

It may be noted that, owing to the fact that in the majority of these cases, it has been found possible to install six modern retorts in the place of each existing setting of four, and, of course, due also to the higher capacity of the new retorts, the carbonizing capacities of those installations have been increased by well over 50%. In the other cases also the capacities have risen to some extent, due to the second cause. The total increase for all the installations mentioned is from 845 tons to 1,296 tons a day.

Orders have been received to rebuild installations on existing lines at Nechells Works (Birmingham), Bristol, Ipswich, Kendal, and Kirkcaldy.

Apart from the orders mentioned above, new installations have been put into operation at Liverpool, Stourbridge, Chester, Exmouth, Carmarthen, and Brecon, while modernized plants, incorporating the latest upwardly-heated design, have been completed at Greenock, Hull, Nottingham, Smethwick, and Stockport.

A Woodall-Duckham intermittent vertical chamber installation has been ordered by the Bishop's Stortford, Harlow, and Epping Gas Company for erection at Epping (25 tons per day). A second large bench of W.-D. intermittent chambers has been started up during the year at Wandsworth.

### Coke Oven Installations.

Three orders have been received for Becker coke oven installations. The Barnsley District Coking Company have ordered a battery of 51 ovens to be erected at Worsborough, Yorkshire, the contract including a by-product plant and a benzole recovery and rectification plant. The plant will deal with coals from the Barrow, Barnsley Main, and Wombwell Collieries, and will have a capacity of 1,111 tons of coal a day. Strakers & Love, Ltd., have ordered 59 ovens for their Brancepeth Coke Works, Willington, Durham. These will be capable of carbonizing 1,000 tons of coal a day, and the contract includes coal handling plant, a comprehensive coke handling, screening, and stocking equipment, by-product and benzole recovery plant, and boosting equipment for a supply of gas to Darlington.

The third contract has been received from Messrs. Stewarts & Lloyds, who have, on the advice of their Consulting Engineers, Messrs. H. A. Brassert & Co., Ltd., placed an order for the extension of the existing battery at their Corby Steelworks by the addition of 51 ovens of the same size as the earlier ovens. This extension will bring the total number of Becker ovens at these works up to 86, and the combined carbonizing capacity of the installations will be 1,825 tons of coal a day. Certain additional oven machinery is included in the contract for the extension. Also during the year a large Becker by-product coking plant has been started up at the Cardiff Dowlais Works of the British (Guest Keen Baldwins) Iron and Steel Company, Ltd., and a further large plant of this type is under construction for the Workington Iron and Steel Company at their Moss Bay Works.

Fifteen W.-D. waste-heat boilers have been ordered during the year in connection with carbonizing plants mentioned above. A T.I.C. tar treatment plant has been ordered for the Sydney Works of the Australian Gas Light Company.

During the year the Company have announced the completion of arrangements for the exploitation in this country of continuous benzole processes according to the designs of the Société des Etablissements Barbet, of Paris. These processes cover the complete range of operations, from the stripping of the benzolized wash oil to the production of pure products of close boiling range. An interesting process on this system, designed at the request of the Gas Light and Coke Company, is devised to remove carbon disulphide by distillation in a highly concentrated heads fraction. Three of these plants have been ordered during 1935, one for the Beckton Station of the Gas Light and Coke Company (2nd installation), and others in connection with the by-product coking plants for the Barnsley District Coking Company and Workington Iron and Steel Company, Ltd. Another installation, for the Grassmoor Company, Ltd., has been put into operation during the year and has achieved very successful results.

In addition to these continuous benzole plants, an order has been received for an intermittent type crude benzole recovery plant for Salford Gas Department.

# Michael & Will on the Law Relating to Gas and Water*

## Gas Volume (Eighth Edition)

The seventh edition of this well-known work was published in 1924. Since that date there has been much legislative activity relating to gas, notably the Gas Undertakings Acts, 1929, 1932, and 1934. The changes made by this legislation have been of the greatest importance—and it is not too much to say that the eighth edition, which has just been published, will be a necessity to all concerned in the administration of the Gas Industry. The Editors, Messrs. Harold I. Willis, B.A., B.C.L., and Leslie F. Stemp, B.A., LL.B., are both barristers-at-law—and they have very wisely decided practically to recast the whole volume. Both they and the publishers are to be congratulated upon the volume now before us, which in matter, arrangement, and typography is a great advance upon its predecessors. The book is divided into seven parts, together with ample and convenient tables of contents, statistics, cases, and a full and comprehensive index.

The authors have included an introduction divided into eight chapters. This introduction is not a reproduction of the introduction to previous editions, but is a newly written, concise, and clear explanation, which will appeal especially to the lay reader, of the object and effect of the various statutes relating to the Industry. The authors have included in this introduction sufficient historical references to show what circumstances have led to the enactment of the various statutes, but, in essence, the introduction forms a concise and convenient summary of the law as it affects gas undertakings (municipal, company, and non-statutory). As the introduction is furnished with an indexed summary, this feature of the work is one which cannot fail to be of the greatest utility.

In Part I. the text of the Gas Regulation Act, 1920, the Gas Undertakings Act, 1929, the Gas Undertakings Act, 1932, the Gas Undertakings Act, 1934, and Rules and Orders, under those Acts, made by the Board of Trade, is set out, fully annotated and explained. The last two Acts, it will be recollected, were passed to give effect to the recommendations of the Gas Legislation Committee set up by the

* Michael & Will on the Law Relating to Gas and Water. Eighth Edition. Gas, by Harold I. Willis, B.A., B.C.L., and Leslie F. Stemp, B.A., LL.B., both of the Middle Temple, Barristers-at-Law. 1936. Royal 8vo: pp. 618 and index. London: Butterworth & Co. (Publishers), Ltd., Bell Yard, Temple Bar.

Board of Trade, and form an important addition to the powers of those responsible for the conduct of gas undertakings.

Part II. consists of the text, with full notes and the latest legal decisions, of the Gas-Works Clauses Acts, 1847 and 1871, and the Gas and Water Works Facilities Acts, together with Rules and Orders. This Part also contains the text of the Model Gas Bill—which consists of clauses which are embodied frequently in local Acts relating to the Industry.

Part III. contains the text of various sections of Acts of Parliament which relate to the powers of Local Authorities in England and Wales with reference to gas supply. These powers have been added to since the last edition by the inclusion in the Road Traffic Act, 1934, of powers relating to the lighting of roads.

Part IV. also relates to a subject which has undergone modification since the last edition—viz., the promotion of and opposition to Bills by Local Authorities. It includes, with notes, the relevant sections of the Local Government Act, 1933, whereunder this modification has been enacted.

In Part V., in addition to the text, with notes of the Public Authorities Protection Act, 1893, and the Conspiracy and Protection of Property Act, 1875, the Editors have decided very wisely to include the text with notes of all the Companies Clauses Consolidation Acts, 1845 to 1889. As these Acts constitute the code under which Statutory Gas Companies are regulated (being almost invariably incorporated with Private Bills, except the sections relating to the conversion of borrowed money into capital), their omission from the seventh volume was to be regretted. Their restoration in this volume will therefore be most welcome, particularly to Directors, Secretaries, and those concerned with accounts and accountancy.

In Part VI. another welcome addition is made—viz., the text of the Lands Clauses Acts, 1845, and Acts amending the same. It is suggested that the Editors might consider, in a future edition, adding notes of decisions under these Acts.

In the last part of the book many of the Acts relating to Gas Supply in the Metropolis are printed. If it is remembered, when consulting these, that, as pointed out by the Editors in their preface—some parts of earlier Acts relating to Metropolis Gas Supply are unrepealed, this part of the work will be very useful for reference.

A word of praise is due on the subject of the make-up of the book. The marginal titles of each section of each Act are printed in heavy type—the printing is clear, and the new index is full and comprehensive. There are two slight suggestions we would offer. In a future edition it might be mentioned on page 7 of the introduction that prior to the passing of the Gas (Standard of Calorific Power) Act, 1916, a large part of the gas supplied by Statutory Companies was sold under a standard of calorific power, by virtue of Local Acts referring to those companies. Then, on page 24, while it is stated that the Gas-Works Clauses Act, 1871, "is almost invariably incorporated with all special Acts and Orders," it might be made clear that by section 3 of that Act its incorporation is compulsory, save where the provisions are "expressly varied or excepted by any such special Act or provisional Order."

These are small points and do not detract in any way from the accuracy of the work, for which we have nothing but praise.

"BARRISTER-AT-LAW."

# INSTITUTION VICE-PRESIDENT'S

Mr. H. C. Smith at Glasgow

# Address to Scottish Juniors

**At a Joint Meeting held in Glasgow on Jan. 11 members of the Scottish Junior Gas Association were addressed by Mr. H. C. Smith, Engineer to the Tottenham and District Gas Company and Junior Vice-President of The Institution of Gas Engineers.**

There was held recently in London the first National Coal Convention which was organized by the Coal Utilisation Council. The Convention was divided into two main sessions. At the second of these Papers were read which had been previously circulated to the delegates, the Authors of most of the Papers being engaged actively in the coal industry. There was very little, if anything, in these Papers to which exception might be taken by the Gas Industry. Indeed, in many cases the Gas Industry might feel complimented by the attention given to its activities. It is true that people who advocate smoke abatement and the lessening of smoke evils were accused of doing so on the grounds that it was in their interest for the smoke nuisance and evil to be abated. But why not? Surely it is those people who are in a position to offer a service which will help to make the atmosphere of our towns cleaner and healthier who should advocate its adoption. We ought to be accused of failing in our duty if we did not.

At the first session addresses were given which were not circulated. One of these was by a Dr. O'Donovan. You have no doubt seen reference to it in the Technical Press. He condemned the gas fire thoroughly and then referred to the various ways in which the medical profession had benefited by the coal industry. He is reported as having said: "Without the industry's aid there would have been no aspirin, no carbolic lotions, Lord Lister would never have risen to eminence, and the Great War would have had thrice its mortality." He lauded the open coal fire to the skies, evidently not appreciating that the industry which is entitled to the credit for conferring the blessings on humanity to which he referred is not the coal industry or the protagonists of the burning of raw coal in open grates, but the Gas Industry which is also responsible for the development of the smokeless gas fire which he appeared to dislike so much.

I have referred to this Convention as it affords an opportunity of illustrating the ignorance and confusion of thought which still exists in the lay mind with regard to our Industry.

We call it "The Gas Industry." It is worthy of a title much more indicative of its importance and activities. We know of its many ramifications, but does the public, or that section of it which forms public opinion know what it owes to the Gas Industry? I am sure it does not.

The day is long past when the criterion of carbonizing was the thousands of cubic feet made per ton of coal, the quality not mattering very much. It is true that in some districts official tests were made of illuminating power, but generally so infrequently as to render them of little value. It was the quantity of gas made which was all-important. The by-products were not considered as products. They were residuals. Coke was a residue resulting from the distillation of coal and was looked upon more or less as a nuisance to be disposed of as quickly as possible. It is true at the highest price obtainable from buyers who would come to the works to fetch it. Tar was a greater nuisance even than coke and was often disposed of down the nearest available ditch.

## Progressive Development.

Many of the public seem to think that the Gas Industry has not advanced beyond this stage. The development of the Gas Industry has been gradual and progressive over a period of more than 100 years and the best practice to-day as carried out by up-to-date and efficiently managed undertakings, whether large or small, will bear very favourable comparison with modern practice in other industries.

The construction of gas-making plants and their scientific methods of control, the improvement in gas-consuming appliances, the development of new uses for gas and its by-products all justify the application of the description *modern* to the production side of the Industry despite its age. Unfortunately the same cannot yet be said of the selling side, although considerable advances have been made in many undertakings. I am sure that those responsible for selling in the undertakings which have developed effective sales organizations would be the first to agree that as an Industry we have a long way to go before our selling side can be described as *modern*. In selling gas we have with our chief competitor, the electrical industry,

an unusual problem. Unlike the purveyors of commodities such as chocolates, cigarettes, tinned foods, alcoholic liquors, and a host of others too numerous to mention, we have only a limited number of potential buyers all of whom live in a prescribed area, whereas they have a national and in some cases an international market. We also are only competing with one main direct competitor, whereas they each have competition from a number of suppliers of the same type of goods. But perhaps the most important difference between us is that they can advertise directly an article they have to sell, while we can only do it indirectly. We have to sell gas and when we sell appliances we do not expect to pay dividends out of the profits, if any, we make on the sale of the appliances. We sell the appliances in order that they may sell for us our principal product gas. This does not make effective advertising easy. It is of no use saying " Use more Gas " unless consumers are shown how they can do so economically and with comfort. Undoubtedly the public likes to have a simple definite proposal put to it. This was shown very clearly in the London District last summer when gas-operated refrigerators were offered on simple easy payment terms which were set out in the advertisements. The result of this offer was a flood of orders not only in the district of the Company making the offer, but also in those of neighbouring companies; unfortunately, to such an extent that the makers of the appliance were unable to supply the demand. As you are probably aware, arrangements have been made to augment considerably the supply during 1936.

The refrigerator load is an important one. While the need for this apparatus is felt most during the summer months when its consumption is of the greatest value to us, there are many days during the winter when the atmospheric temperature is high enough to cause the householder to appreciate the benefits of an appliance which will preserve food. When speaking of atmospheric temperatures I ought to say that I am referring to conditions in the south.

The refrigerator load is particularly important as it is entirely new. It is essential for us to convince domestic consumers that gas can be used with advantage for purposes other than lighting and cooking and at a price they can afford to pay. Speaking generally, the average consumption per domestic consumer is decreasing, due very largely to the replacement of old and wasteful appliances by up-to-date and economical ones. I do not know if your experience is the same as that in the south, but there we find that while our sales of new appliances increase considerably each year, the sales of gas do not increase in anything like the same ratio, as a large amount of the business done is in exchanging old and inefficient appliances for those which are attractive and much more efficient.

In many cases the fixing of gas-heated wash coppers and water heaters does not result in the immediate increase in consumption which might be expected. Often water had been heated in buckets on the hotplate of the cooker before the installation of a copper or geyser and the advent of the latter for a time only results in greater convenience to the consumer with little increase in the gas consumption. Consumptions gradually increase as the comfort of hot water is realized, but what we have to appreciate is that whatever the convenience and comfort may be of having a supply of hot water always on tap, the fact remains that many consumers (in some districts the majority) have a very limited sum of money which they are able to spend on lighting, cooking, and heating, and if this amount is to be increased it can only be at the expense of some other commodity.

## Many Competitors.

I have referred to electricity as our principal competitor, but all the commodities which I have mentioned, together with many others, are indirectly our competitors, including the cinema, wireless, and the cheap motor car. One of our problems with those consumers whose budget only allows a very small expenditure on gas is to convince them that they would be much better off if they cut down their consumption of chocolates, cigarettes, &c., and also their visits to the cinema and treated themselves instead to the luxury of having hot water always on tap and the comfort afforded by gas fires.

We are sometimes told that the way to sell more gas per consumer is to adopt attractive tariffs. Obviously the lower the price of gas the easier it is to sell, other things being equal, but it is not enough for us to depend on low prices of gas to increase the amount of gas sold per consumer. This must be accompanied by sound salesmanship backed up by good service.

Generally good service (and what a multitude of different items are covered by this term from the supply of gas of a constant quality and composition at a constant pressure to the politeness of the telephone operator who answers a consumer's call) is costly, but sometimes we can find means of providing consumers with better service at a reduced cost to ourselves.

Some changes in my Company's practice provide illustrations of this. In exchanging appliances such as cookers and fires the old practice was for the new appliance to be delivered to the consumer by motor lorry specially detailed for this work. As soon as possible after the new appliance had been delivered a fitter attended and fixed it, leaving the old one to be collected. The collection was made when convenient to the Company, generally when a motor lorry was in the consumer's district again. The consumer first of all was inconvenienced by the presence of the new cooker or fire before it was fixed and afterwards by the old appliance which often was finally put out of doors to await collection. This transaction necessitated two visits by a motor lorry, the inconvenience to the consumer of finding accommodation for bulky appliances before and after fixing and the annoyance caused by the time taken to carry out the whole transaction. In addition to the annoyance caused to the consumer the system was expensive to the Company. While the appliances were delivered and collected by motor transport the fitter and mate walked from the depôt to the consumer's residence pushing their truck with tools and fittings. An experiment was made a few years ago in which the fitter and mate were provided with a 15-cwt. van fitted with a body capable of carrying 8 cookers or an equivalent number of fires, together with fitter's tools and fittings. The fitter or his mate drove the van, delivered the new appliances to the addresses where they were to be fixed, fixed them, and at the same time removed the old ones and returned them to store. This experiment was found to be a complete success. The consumer appreciated the improved service and the cost of doing the job, including the transport of the appliances, was lower than under the previous system. The system is now long past the experimental stage and has been extended to cover where practicable all exchanges and the fixing of appliances to existing points. All new houses erected in the area are carcassed either by the Company or the builder for several gas points.

## Fixing Included in Charge.

Perhaps I may give one more instance of a change in my Company's practice which results in better service at lower cost. A consumer having arranged to purchase an appliance then found that there was something in addition to pay for fixing. In many cases this necessitated a call being made by an Inspector or his assistant who measured up the job and furnished an estimate of the cost. This practice has now been changed and the fixing charges have been included in the price charged for the appliance. This applies to appliances sold for cash, on hire-purchase, and to those rented on simple hire. Sufficient data was available to enable a satisfactory average fixing charge to be arrived at. Some consumers pay a little more for fixing than under the old system while some pay a little less, but we find that the consumer does appreciate an inclusive price being quoted by the showroom attendant. This system not only pleases the consumer but saves the expense of several calls by the inspector or his staff, as in many cases the showroom attendant can judge the suitability of the cooker or fire from the information given by the consumer and can clinch the sale on the spot. If any doubt arises on the question of suitability a call is made. A call is always made in the case of water heaters. It is a regular practice now when ordering gas fires for consumers to bring a sample of material the colour of which they require the fire to match. The majority of fires sold are coloured by the Company to consumers' requirements.

I have no doubt that in some of the undertakings represented here to-day systems similar to those I have briefly described are in operation. I have quoted them as instances of how better service can be given at a reduced cost. No doubt some of you can give other examples.

Generally, however, improved service means higher costs and these higher costs coupled with many other increases which occur in the cost of selling and distributing gas all point to the necessity of increasing the consumption per consumer.

The actual costs of main and service laying have been increased through the operation of town planning schemes. I am sure we should all agree that any scheme which provides the householder with more light and air should ultimately react to the benefit of the community, but in the meantime our costs of distribution are increased in such a manner that it is very difficult, if not impossible in many cases, for us to recover directly the increased cost. If I may take another example from my Company's area, new houses are now erected to a density of approximately 12

to the acre. To supply these mains would be laid of a minimum diameter of 4 in. As the roads are now generally surfaced in concrete, if not when first made, when they are due for resurfacing, two 4-in. mains are laid, one in each footpath. On an average 8·4 yds. of 4-in. main and 25 ft. of 1-in. (minimum) service pipe per house would be used, the total cost of laying mains and services amounting to £5·83 per house. Compare this with previous practice when houses were often built to a density of 32 to the acre when roads were narrower and surfaced with macadam so that one 4-in. main was ample. In this case only 2·5 yds. of 4-in. main were required per house, the length of the service on one side of the road being 20 ft. and on the other 40 ft. The cost of laying mains and services to these houses would only amount to £3·25 per house, the cost in both this case and the previous one being based on present-day prices for labour and materials and in the case of the houses built to the density of only 12 to the acre showing an increase of 79%, this increase being due entirely to the lower density of the building, any extra charge due to post-war prices being ignored. In addition, the cost of trunk mains is higher on account of the reduced density of building.

### Cost Comparisons.

These increases in cost would not be so important if the consumption per consumer were increasing rather than decreasing. If you have not already done so I would recommend you to compare the costs of manufacture and distribution in your undertakings to-day with your pre-war costs.

In the case of my Company the manufacturing costs per therm sold less the amounts recovered for by-products show an increase in 1934 of a little over 50% on the comparative costs in 1913, while the distribution charges show an increase of 100%. These increases, of course, are partly accounted for by the higher costs of labour and materials in the post-war period.

The increase in the cost of distributing its products is not only found in the Gas Industry but is common to many others and it is up to all of us to do our best to reduce them by using every endeavour to increase the quantity of gas used by each consumer. I have said that a large part of the business done by our sales staff results in the exchange of old and inefficient appliances for modern ones which use less gas. I should not like to convey the impression that I do not agree with this policy. I believe it to be absolutely sound and essential. We must see that our consumers have the advantage of benefiting by the use of the best appliances available. It is only by so doing that we can make secure the position we hold to-day. But at the same time unless we can offer to them new uses for gas on attractive terms the average consumption must gradually decrease with an inevitable increase in the cost of distribution.

For refrigeration, for intermittent use on fires and instantaneous water heaters, and for wash coppers we provide a fuel which is clean, convenient, and economical. Where suitable tariffs are available we can also recommend gas with confidence for constant use in fires and in thermal storage heaters. I say with confidence because I am strongly opposed to any salesman trying to persuade a consumer to install an appliance for any purpose unless it be such that the consumer can afford to use it. With these and other appliances we are able to offer I am confident that we shall gradually recover the consumption per consumer we have lost and in time exceed it, but every effort on the part of our sales staff will be required and in many cases we shall have to convince consumers whose income leaves very little to spare that they will benefit by spending a little more on gas and a little less in other directions.

Not only do we require from our sales staff the very best they are capable of giving, but we cannot afford any relaxation of effort on the part of those engaged in production. There has been a tendency in some directions to belittle the efforts of our works' staffs by endeavouring to draw comparisons between the importance of manufacture and selling. There is no need for anyone engaged on the manufacturing side of the Industry to feel discouraged or disgruntled by such a comparison. They should rather take it as a compliment that the high degree of efficiency which has been reached in manufacture has been recognized, and this recognition should spur them on to greater efforts in assisting the selling members of their team. It is much easier to win the match with a good first innings score than a poor one, or perhaps in Glasgow it would be more appropriate to say that while you may lose the game through over-confidence or through taking things too easily after being six up at the sixth hole, if you have the will to win a good lead at the start will make the beating you give your opponent more decisive.

While it is useless making gas if you cannot sell it, it is a poor sort of game trying to sell gas at a price which is higher than the purchaser can pay or which is of such a composition or is supplied at such a pressure as causes discontent. We have not yet reached finality in carbonization or purification, in the preparation, treatment, and disposal of by-products or in the distribution of gas, and there are plenty of problems left still for our engineers, chemists, and physicists to solve as a study of the proceedings of the Research Meetings of The Institution of Gas Engineers will indicate. While many of us may not have the facilities available for assisting in the solving of these problems we can all play our part in applying the lessons learned by others and made available for our use.

## Discussion.

Mr. ALEX. BUJNOWSKI (President of the Western District) said that the use of a 15 cwt. van by fitters delivering new appliances and removing the old was a new idea to him, and he considered it to be excellent. He asked if the van carried tubing and other fitter's kit, and if the job was measured previously.

Mr. SMITH replied that there was only one call made.

Mr. BUJNOWSKI said that the inclusion of the fixing charge in the price of the appliance was a good idea. It was better if the consumer knew the total cost, as sales were often lost through the additional charge for fixing, whereas if the total cost had been quoted at the start the sale would have been effected.

Mr. A. C. REA (Edinburgh) thought that it would be better to consider the consumption per head of population. This would give a better idea of the consumption of gas in relation to population if not to costs. With regard to gas fires, Mr. Rea said that he considered it essential to have one open fire in every house. This was required from a hygienic as well as an economic standpoint. He commented on the fact that distribution costs had increased more than manufacturing costs, and said that in the Industry about 90% of the technical brains were on the manufacturing side. He suggested that a more equal division should be made.

Mr. R. COWIE (Hawick) felt that the Industry had not yet got away from considering matters from the point of view of the quantity of gas produced per ton of coal carbonized. The Gas Industry was a coal treatment industry, and there was no limit to the amount of coal which could be carbonized. This, at present, was controlled by the output available for the gas, and he thought that a bigger consumption could be obtained by a bigger throughput and more attention to by-products such as coke and benzole.

Mr. N. STURROCK (Greenock) asked if the use of a van by the fitters had resulted in an increase in the number of cookers fitted in one day, and why was a call always made in the case of water heaters. He wondered if any tests were conducted on the water pressure.

Mr. J. GREIG (Glasgow) said that the selling of coke in London and in Glasgow seemed to be a different proposition. In Glasgow coal was so cheap that unless a smokeless fuel was very good and very cheap it could not compete. New houses being built in Glasgow were not fitted with fires suitable for the use of smokeless fuel.

Mr. DOW (Perth) wanted to know what was being done in London to retain the lighting load. He referred to the inclusive fixing charge and asked if this included a service charge for installing points.

Mr. J. WEBSTER (Port Glasgow) remarked that the consumption per consumer he considered was usually the ratio of total sales to consumers. This gave an entirely erroneous figure. Some consumers were using 2 million cu.ft., while others only used 2,000 cu.ft. Consumers should be considered in grades, and the figure arrived at by taking the consumption per apartment in the case of domestic consumers. There were other means of helping consumers besides direct service. He issued bills every two months and so divided expenditure more evenly over the year. He was well aware of the increased cost of distribution, for, on an estate on which he was working, eight times the length of main was now required.

Mr. S. MCGOWN (Glasgow) suggested that it would be better to give appliances and meters for nothing and make an initial charge based on the capital expended in fitting out a consumer's premises. Then gas could be sold at the manufacturing cost *plus* a very small additional charge. Gas would then be sold very cheaply, and though the initial cost to the consumer would be high, he thought that the system would be better than at present.

Mr. S. SMITH (Dunfermline) said that consumption per consumer was decreasing at the moment, but he thought that the Industry was passing through a transitional period. Some output was being lost, but new fields were being opened up. He was not sure whether Mr. Smith had meant that a consumer should not be induced to buy an appliance he could not afford to purchase or whether he meant appliances the consumer could not afford to use. If the former were the case then he thought that arrangements could be made to pay for the appliance through the meter

Mr. J. WILSON (Dundee) asked if Mr. Smith placed any restrictions on who got a new appliance in exchange for an old one, and if there were any restrictions on hire-purchase terms. He wanted to know what was the basis for hire-purchase terms, over how many years the payment was extended, and what on-cost was allowed to cover loss on purchasers who failed to fulfil their contract.

Mr. W. GLEDHILL (Stirling) mentioned coke sales, and referred to the London and Counties Coke Association. He said that he

*Continued on p. 163.*

**The Lists will open on Wednesday, 15th January, 1936, and will close on or before Friday, 17th January, 1936.**

*BY ORDER OF THE DIRECTORS. NEW ISSUE OF 4 PER CENT. PREFERENCE STOCK.*

# THE WANDSWORTH AND DISTRICT GAS COMPANY.

*(Incorporated by Special Act of Parliament passed in 1912.)*

**DIRECTORS.**

FRANK H. JONES, M.Inst.C.E. (Chairman and Managing Director).
P. A. IVES HOWELL, J.P. (Deputy Chairman).
G. F. PAGE, J.P.; R. M. CHART, J.P.; J. BROMLEY HOWELL; B. R. GREEN; E. SHERRARD; J. B. BROWN; H. F. H. JONES.

**AUDITORS.**

B. HENNELL, F.C.A.; B. DENNETT HOLROYD, F.C.A.

**CHIEF ENGINEER AND GENERAL MANAGER.**

C. M. CROFT, M.Inst.C.E., M.I.Mech.E.

**COMPTROLLER.**—L. BATES, A.C.I.S.

**SECRETARY.**—W. H. CROMARTY, F.C.I.S.

**BANKERS.**

BARCLAYS BANK LIMITED, 54, Lombard Street, E.C.3, and High Street, Wandsworth, S.W.18.

**BROKERS.**

SEYMOUR, PIERCE & COMPANY, 5, Lothbury, London, E.C.2, and Stock Exchange.

## THE WANDSWORTH AND DISTRICT GAS COMPANY ISSUE OF

# £500,000 4½ per cent. Preference Stock

## At £104 10s. 0d. per £100 of Stock, yielding a return of £3 16s. 6d. per cent.

A deposit of 10 per cent. of the nominal amount of the Stock applied for must accompany the application, and the balance must be paid on or before the 31st January, 1936, to the Company's Bankers, BARCLAYS BANK LIMITED, at their Head Office, 54, Lombard Street, E.C.3, or High Street, Wandsworth, S.W.18.

The Dividend on this issue will commence to accrue as from 1st February next, and five months' dividend to 30th June next will be paid on the 1st September, 1936, and thereafter half-yearly, viz., 1st March and 1st September.

The Company was incorporated by Special Act of Parliament in 1912 and obtained further powers in 1918, 1920, 1921, 1929, 1930, 1931, and 1934. In 1930 the Company acquired the undertaking of the Kingston-upon-Thames Gas Company and in 1931 the undertaking of the Sutton Gas Company.

The Company is the third largest gas undertaking in the Metropolis.

Since the 1st January, 1930, when the various ordinary stocks of the Company were consolidated into one class the dividend on the Consolidated Stock has been at the rate of 7 per cent. per annum.

The net income of the Company for the year ending 31st December, 1934, was £229,386 19s. 5d., which was increased to the sum of £273,271 10s. 3d. by sums of £21,453 18s. 4d. brought forward from the previous year, £15,000 transferred from Income Tax Account and £7,430 12s. 6d. interest received and accrued due in respect of Development (Loan Guarantees and Grants) Act, 1929. After payment of the Debenture Stock and other interest charges for the year ending 31st December, 1934, and making provision for the amortisation of the compensation paid to the Directors and Officials of the Kingston and Sutton Companies and paying the Dividends on the Preference and Consolidated Stocks for the half-year ending 30th June, 1934, there was a balance available for dividends on the Preference and Consolidated Stocks of the Company for the half-year to 31st December, 1934, of £103,978 7s. 8d., and these amounting to £80,718 16s. 6d. were paid on the 1st March last.

In the month of May, 1934, a sum of £208,300 4 per cent. Debenture Stock was issued and a further £130,000 of this stock was issued in the month of March last. In September, 1935, a dividend at the rate of 7 per centum per annum was paid on the Consolidated Stock in respect of the half-year ending 30th June, 1935.

The area supplied by the Company now comprises 77 square miles and includes the districts of Ashtead, Banstead, Burgh Heath, Cheam, Chessington, Claygate, Coombe, Cuddington, Earlsfield, Epsom, Esher, Ewell, Hook, Kingston, Long Ditton, Malden, Merton, Mitcham, Morden, New Malden, Norbiton, Putney, Raynes Park, Southfields, Surbiton, Sutton, Tadworth, Thames Ditton, Tolworth, Tooting, Wandsworth, Wimbledon, Worcester Park, and parts of Battersea, Carshalton, and Streatham.

The basic price of gas throughout the whole of the limits of supply of the Company is elevenpence per therm. Under the Wandsworth and District Gas Acts and Orders, 1912 to 1934, the price to be charged by the Company for gas supplied throughout the limits of supply other than the Wandsworth limits may exceed the price charged within the Wandsworth limits by the following amounts, namely, within the Wimbledon limits 3-5ths of a penny per therm, within the Kingston limits 1 2-5d. per therm, within the Epsom limits 2 1-5d. per therm, and within the Sutton limits 1d. per therm subject as regards the Kingston limits and the Epsom limits to possible reductions to 1d. per therm and 1 4-5d. per therm respectively above the price charged in the Wandsworth limits. The Wandsworth Wimbledon and Epsom District Gas Act, 1929, requires the Company to promote a Bill in Parliament not later than the Session of 1937 proposing a revision of the basic price or giving an opportunity for such a revision to be made.

The selling prices in the various limits of supply at the present time are: Wandsworth limits 8d. per therm, Wimbledon limits 8 3-5d. per therm, Kingston limits 9 2-5d. per therm, Epsom limits 10 1-5d. per therm, and Sutton limits 9d. per therm.

The sale of gas and number of consumers supplied within the whole area now supplied by the Company have been as follows:—

| Year. | Sale of Gas (Therms). | No. of Consumers. |
|---|---|---|
| 1930 ... ... ... ... ... | 25,176,967 | 139,626 |
| 1931 ... ... ... ... ... | 26,488,726 | 147,261 |
| 1932 ... ... ... ... ... | 26,700,300 | 153,553 |
| 1933 ... ... ... ... ... | 26,382,670 | 160,843 |
| 1934 ... ... ... ... ... | 26,983,664 | 168,744 |

The Company's mains extend nearly 1,000 miles.

On the 13th March, 1935, the Company entered into a provisional Agreement for the Acquisition of the undertaking of the Leatherhead Gas and Lighting Company who are authorised to supply gas throughout an area of about 40 square miles adjoining the limits of supply of the Company on the south-west, and an application was made to the Board of Trade for a Special Order for the transfer of the undertaking of the Leatherhead Company to the Company. An Inquiry was held by the Board of Trade into the application on the 13th and 14th June last and on the 4th December, 1935, a Draft Order was laid on the table of both Houses of Parliament for approval. Two Petitions praying for leave to be heard against certain provisions of the Order were deposited and these Petitions will probably be heard by the Special Orders Committee of the House of Lords in February.

On the 10th July, 1935, the Company entered into a provisional Agreement for the Acquisition of the undertaking of the Walton-on-Thames and Weybridge Gas Company who supply gas in an area of about 15 square miles which also adjoins the area of the Company. An application will shortly be made to the Board of Trade for a Special Order to give effect to this Agreement.

The Map accompanying the Prospectus indicates the limits of supply of the Wandsworth, Leatherhead, and Walton Companies.

The Company have a controlling interest in The Woking District Gas Company, having recently acquired a majority holding of approximately 92 per cent. of the Ordinary and Preference Capital of that Company.

The proceeds of the present issue are required for the repayment of a loan by the Company's Bankers, to meet the cost of additional mains, appliances, etc., necessitated by the continual rapid development of the Company's business and for general purposes.

Under a contract dated 10th January, 1936, between the Company and Messrs. Seymour, Pierce & Company, the Stock now offered has been underwritten for a commission of 1¼ per cent.

| | £ | s. | d. |
|---|---|---|---|
| The authorised Capital Stock of the Company is | 3,400,000 | 0 | 0 |
| Of which there has been paid up to 31st December, 1935:— | | | |
| Preference Stock, 5 per cent. ... ... ... | 1,371,373 | 0 | 0 |
| Consolidated Ordinary Stock ... ... ... | 1,340,521 | 0 | 0 |
| Premiums (net) ... ... ... ... ... | 106,357 | 12 | 9 |
| | £2,818,251 | 12 | 9 |
| Balance remaining to be raised by the issue of Preference and/or Ordinary Stock (of which the £500,000 now referred to forms part) ... | 581,748 | 7 | 3 |
| | £3,400,000 | 0 | 0 |
| The authorised Loan Capital is ... ... ... | £2,040,000 | 0 | 0 |
| Of which there has been issued up to 31st December, 1935:— | | | |
| 5 per cent. Perpetual Debenture Stock ... | 1,317,964 | 0 | 0 |
| 4 per cent. Perpetual Debenture Stock ... | 338,300 | 0 | 0 |
| Reduced on Conversion *less* discounts (net) | 20,219 | 10 | 0 |
| | 1,676,483 | 10 | 0 |
| Remaining to be borrowed (subject in part to the raising of Capital Stock) ... ... | 363,516 | 10 | 0 |
| | £2,040,000 | 0 | 0 |

The Reserve Fund on the 31st December, 1934, stood at £46,695 12s. 5d., and the Special Purposes Fund £73,725 5s. 0d.

The accounts of the Company are made up yearly to the 31st December.

The Stocks of the Company are quoted in the Stock Exchange Official List and Application will be made for the inclusion of the present issue.

All Stock allotted when fully paid will be registered in the books of the Company and certificates issued free of expense, after which it will be transferable by deed in multiples of £1.

If no allotment is made the deposit will be returned in full, and in case of partial allotment, the balance of the deposit will be applied to the balance of the purchase money due.

Interest at the rate of 10 per cent. per annum will be chargeable on any balance of purchase money not paid by 31st January, 1936.

Copies of this Prospectus may be obtained at the Chief Office of the Company, Fairfield Street, Wandsworth, S.W.18, or at any of the Showrooms, as under:—

134, High Street, Putney, S.W.15; 62, High Street, Wandsworth, S.W.18; Therm House, 609, York Road, Wandsworth, S.W.18; 413, Durnsford Road, Wimbledon, S.W.19; 30, Hill Road, Wimbledon, S.W.19; 256, Upper Tooting Road, S.W.17; 354, London Road, Mitcham; 88, High Street, Epsom; 38, Thames Street, Kingston; 16, Brighton Road, Surbiton; 97, Malden Road, New Malden; High Street, Esher; 19, High Street, Sutton; Tower Road, Tadworth; 103, Central Road, Worcester Park; at Barclays Bank Limited, 54, Lombard Street, London, E.C.3, and Branches; also Messrs. Seymour, Pierce & Co., 5, Lothbury, London, E.C.2.

CHIEF OFFICE:—FAIRFIELD STREET, WANDSWORTH, S.W.18.

By Order,
W. H. CROMARTY,
Secretary.

14th January, 1936.

**The Lists will open on Wednesday, 15th January, 1936, and will close on or before Friday, 17th January, 1936.**

### FORM OF APPLICATION FOR PREFERENCE STOCK.

**Applications must be made upon this form, and sent in a sealed envelope marked "Application for Stock," to:—**

**THE CHAIRMAN,**
**THE WANDSWORTH AND DISTRICT GAS COMPANY,**
**FAIRFIELD STREET, WANDSWORTH, S.W. 18.**

**Cheques should be made payable to the Wandsworth Gas Company and crossed "Barclays Bank Ltd." Remittances by postal orders or cash should be registered.**

**To the Directors of**

## THE WANDSWORTH AND DISTRICT GAS COMPANY.

**I hereby apply for (*a*) £..... [(*a*) State the nominal amount of Stock applied for, which must be £5 or multiples thereof] of 4 per cent. Preference Stock of the Company in accordance with the terms of the Prospectus dated 14th January, 1936.**

**I enclose herewith (*b*) {Cheque / Money or Postal Order / Cash} for £..... [(*b*) Strike out words not required], being 10 per cent. deposit of the nominal amount applied for, and agree to accept such amount, or any less amount that may be allotted to me, and to pay the balance of the purchase money to the Company's Bankers on or before the 31st January, 1936.**

NAME in full .....

ADDRESS in full .....

.....

DESCRIPTION .....
(If a Lady, please state whether Married, Widow, or Spinster.)

SIGNATURE .....

DATE .....January, 1936.

NOTE.—No receipt will be issued in respect of the above payment, but an acknowledgment will be forwarded in due course, either by Letter of Allotment, or return of deposit.

himself had modern plant for dealing with coke, but met with heavy competition from local coal people. He wondered what the conditions were in Mr. Smith's district, and asked how he met competition and increased sales. He had started a hire-purchase scheme and had doubled his sales during the past year. This had helped to increase the domestic load on account of the number of gas fires in use.

Mr. J. K. FRAZER (Glasgow) advised salesmen never to try to sell something which was not required. The use of the van for delivery and collection of appliances was an excellent idea, and irrespective of cost would be of benefit to the Industry.

## The Author's Reply.

Mr. SMITH said that his own Company had spent £100,000 in an endeavour to give consumers equality of pressure, and he was glad to be able to say that they had been successful. Those who were interested would find an account of this in the "GAS JOURNAL." He then described some of the activities of the London and Counties Coke Association, and said that practically every gas undertaking south-east of a line from Norwich to Portsmouth was a member. The Association had done an enormous amount of good work. It had regulated prices, though that was not its primary object. It had helped to improve methods of preparing and sizing coke. Coke was a different fuel to-day from what it was 5 years ago. It was easy to meet competition when everyone got together. There was a working arrangement with coal and coke factors, but everyone was free to tackle his own domestic consumers. His own Company started eight years ago to induce domestic consumers to get all their coke from the gas-works, and those doing so got a small rebate. There were now a large number of open coke grates. It was his own opinion that the price of gas was too high for continuous use. In order to induce the continuous use of gas fires, special terms would be required; and if this was not possible, then an open coal or coke fire would be used. A generation would arise, he said, who would not use solid fuel, but until that time arose the thing to do was to push the use of coke. More would be sold at a better price, and the price of gas could be reduced.

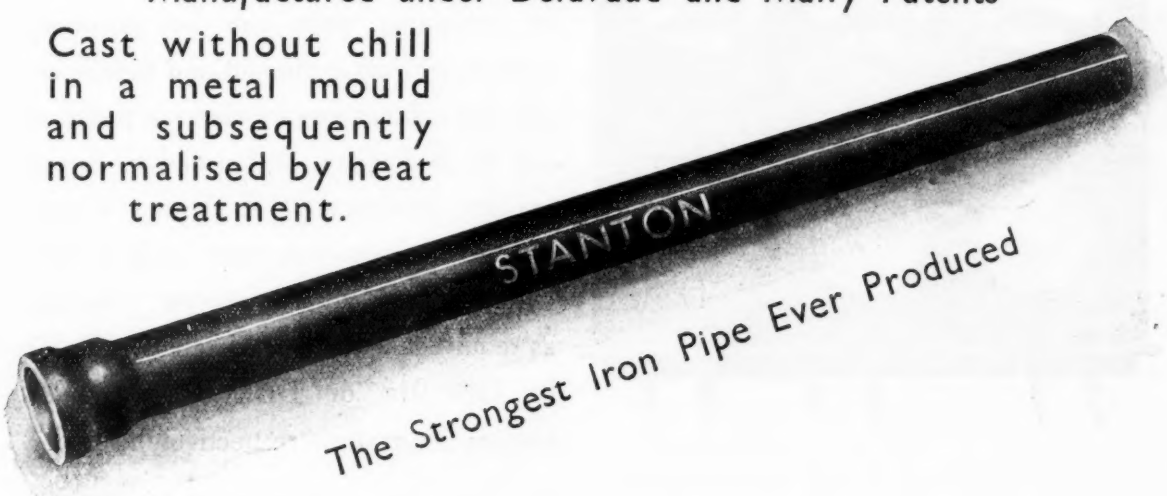
He was a firm believer in hire purchase, and when his Undertaking started this type of business 12 years ago their business in the sale of appliances amounted to £20,000 per annum. Last year the figure reached £120,000, and the increase in sales last year over 1934 equalled the total sales 12 years ago. Very few consumers failed to complete the purchase, and this possibility was not taken into consideration when fixing the price. They sold practically everything on hire purchase, but took reasonable precautions to find out if the consumer could pay if the installation is a large one. He believed that they would eventually reach a stage when the decrease in consumption stopped and an increase started again. Some undertakings were getting new business at such a rate that it kept up the total, but until the stage was reached when they were selling more instead of less gas, there was hard work ahead of the Industry. He was particularly anxious about the refrigerator load, because it was new and not replacing anything.

As regards tariffs, he said that enough had been said and written for any undertaking to be able to apply tariffs to its own particular requirements. It was easy to apply tariffs to industrial users; and though he had not mentioned the industrial load in his Address, his own Company's industrial load was increasing by leaps and bounds. They had established an industrial department, and manufacturers were now coming and asking for advice. He appreciated that conditions were different in Scotland, and one could not generalize on the value of coke made in Scotland and, say, in South Yorkshire.

When calculating the consumption per consumer, he always divided consumers into different classes. He was pleased to be able to say that his Company still had 90% of the street lighting in the district. Most of the open coke fires fitted in his district were conversions, and such conversion might be paid for through the meter. Since they had introduced the fitter's van the fitter and his mate could install on an average eight cookers per day. The work done was chiefly exchanges, but there had been a 75% increase in this business since the introduction of the van. He agreed that it should be cheaper to produce gas if more attention were paid to residuals, but he did not know if a good yield of benzole could be obtained from the coal used in Scotland. He said that even if the consumption were taken per head of population, it would be found in most cases to be going down. The Gas Industry could not run a "Million More Consumers" campaign, because there were not a million more consumers to be obtained. In the South where gas was available everyone was a consumer. The problem was how to get them to use more gas. The only way to do this was to offer them appliances on attractive terms, get these installed in their homes, and let them see the comfort and convenience of these appliances.

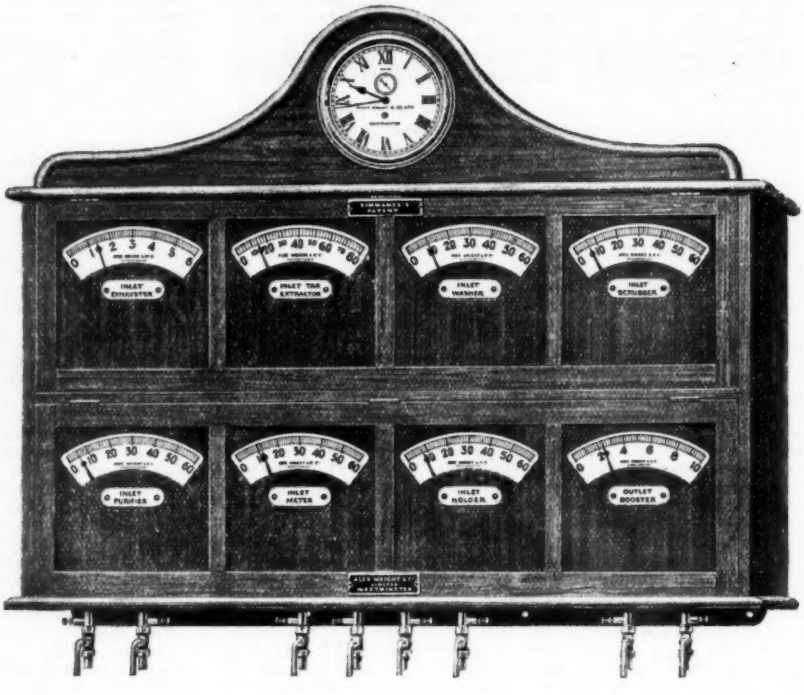
A vote of thanks to Mr. Smith was proposed by Mr. A. J. DORAN (Edinburgh), President of the Eastern District.

STANTON
NEW SPUN IRON PIPE
*Manufactured under Delavaud and Mairy Patents*
Cast without chill in a metal mould and subsequently normalised by heat treatment.

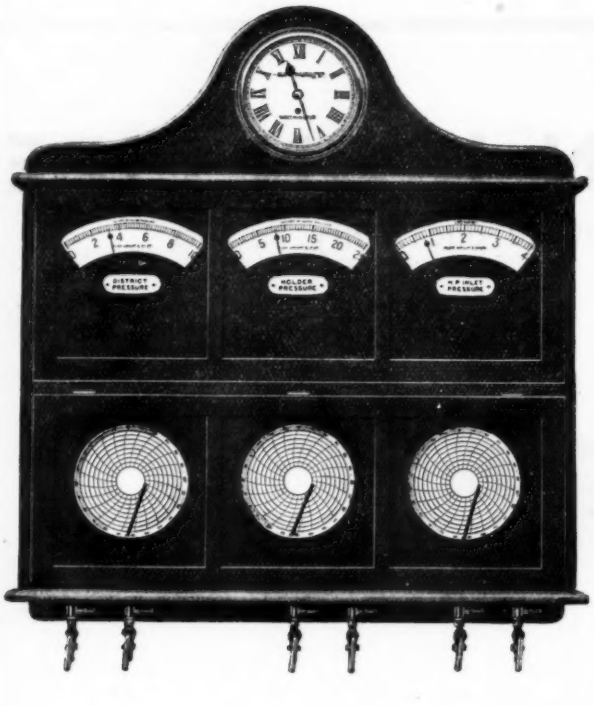



**The Stanton Ironworks Company Limited, Near Nottingham**

**This is the first of a series of advertisements designed to give Engineers some idea of the many ways in which they can accommodate many Gauges in comparatively small space. Variations from standard designs can be made in most cases, and we are at all times ready to meet customers' special requirements whenever possible.**




# GAUGE BATTERIES




No. 1.—The illustrations are typical of batteries of Simmance Patent Dead-Beat Indicators and Recorders which we have supplied to many customers. Similar batteries for any number of indicating or recording units can be supplied, with or without pediment and timepiece, and the cabinet can be made in polished oak or mahogany, or finished to match existing furnishings. Each unit is provided with two-way vent cock, needle valve and zero-adjusting screw. Ranges as required, with lettered labels Refer to DBI. 916 or DBIR. 940 (top or bottom illustration respectively).

**ALEXANDER WRIGHT & CO LTD**

1, WESTMINSTER PALACE GARDENS, VICTORIA STREET

Telephone: VICTORIA 1207

WESTMINSTER, S.W.1

Telegrams: Precision, Sowest, London

# Gas Markets and Manufactures

## Stock Market Report

(For Stock and Share Lists, see later pages)

The coal and rail problems were the main contributory causes for the inactivity on the Stock Exchange last week, and it was not until almost at the close, when more reassuring coal news became known, that markets began to display a brighter outlook. The general undertone throughout, however, was firm, and latterly home rail prior-charge stocks made a substantial recovery, while a feature of the week was the activity in the Rubber Market brought about by the higher price of the commodity.

It is satisfactory to note that Gas stocks and shares have not been adversely affected at any time during the coal crisis, and with the prospects of a settlement a few quotations were marked up last week. It will be seen in the Stock and Share List that on the London Exchange several fixed interest stocks improved, while among "ordinaries" Watford and St. Albans rose a further 2 points to 155½. In the Supplementary List Weymouth ordinary registered a gain of 7 points to 110½, at which price this stock still appears considerably undervalued, the yield on a 6% basis working out at £5 8s. 8d.%. Most of the leading stocks on the Provincial Exchanges showed gains, including Liverpool, Newcastle, and Sheffield, while South Shields, which has remained steady at 172 for some months past, was marked up 2 points.

## Current Sales of Gas Products

### The London Market for Tar Products.

*Jan.* 13.

The prices of tar products remain unaltered at the following levels:

Pitch is said to be 42s. 6d. to 45s. per ton f.o.b.

Creosote, about 5½d. per gallon in bulk.

Refined tar, 4d. per gallon in bulk at makers' works. Pure toluole, 2s. 9d. to 2s. 10d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 8d. to 1s. 9d.; and 90/160 pyridine, about 4s. 9d., all per gallon naked at makers' works.

### Tar Products in the Provinces.

*Jan.* 13.

The average prices of gas-works products during the week were: Gas-works tar, 24s. 6d. to 29s. 6d. Pitch—East Coast. 42s. 6d. to 45s. f.o.b. West Coast—Manchester, Liverpool. Clyde, 42s. 6d to 45s.* Toluole, naked, North, 2s. 2d. to 2s. 4d. Coal-tar crude naphtha, in bulk, North, 7¾d. to 8d. Solvent naphtha, naked, North, 1s. 6d. to 1s. 6½d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 5d.; low gravity, 4½d. to 4¾d.; Scotland, 4¾d. to 5d. Heavy oils, in bulk, North, 4¾d. to 5d. Carbolic acid 60's, 2s. 4d. to 2s. 6d. Naphthalene, £18 to £20. Salts, 85s. to 90s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

### Tar Products in Scotland.

GLASGOW, *Jan.* 11.

Supplies are not too plentiful in this district and business is therefore rather restricted. Prices are steady in all departments.

Crude gas-works tar.—The actual value is 30s. to 31s. per ton *ex* works in bulk.

Pitch.—Quotations for vertical quality range from 35s. to 37s. 6d. per ton f.o.b. Glasgow for export and 35s. per ton *ex* works in bulk for home trade.

Refined tar shows an increase at 2¾d. to 3d. per gallon naked at makers' works, according to quantity.

Creosote oil.—A steady business is being conducted and prices are firm. B.E.S.A. Specification, 5½d. to 5¾d. per gallon; low gravity, 5⅝d. to 5⅝d. per gallon; and neutral oil, 5⅝d. to 5⅝d. per gallon; all f.o.r. in bulk.

Cresylic acid.—With practically nothing available prices are purely nominal as under: Pale, 97/99%, 1s. 5d. to 1s. 5½d. per gallon; dark, 97/99%, 1s. 3d. to 1s. 3½d. per gallon; and pale, 99/100%, 1s. 5d. to 1s. 6d. per gallon; all *ex* works naked.

Crude naphtha is only available in small quantities and is valued at 5¼d. to 5⅜d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is unchanged at 1s. 4d. to 1s. 4½d. per gallon, and 90/190 heavy naphtha is higher at 1s. to 1s. 1d. per gallon.

Motor benzole is quoted in small quantities at 1s. 3½d. to 1s. 4d. per gallon in bulk at makers' works.

Pyridines.—90/160 grade is now 4s. 6d. to 5s. per gallon, and 90/140 grade, 5s. to 5s. 6d. per gallon.

### Benzole Prices.

These are considered to be the market prices for benzole at the present time:

| | s. d. | | s. d. | |
|---|---|---|---|---|
| Crude benzole | 0 9½ | to | 0 10 | per gallon at works |
| Motor ,, | 1 3 | ,, | 1 3½ | ,, ,, ,, |
| 90% ,, | 1 4 | ,, | 1 4½ | ,, ,, ,, |
| Pure ,, | 1 7½ | ,, | 1 8 | ,, ,, ,, |

## Contracts Advertised To-Day

**Asbestos Goods.**
Salford Corporation. [p. 169.]

**Coal.**
Salford Corporation. [p. 169.]

**Engine and Exhauster.**
Prestatyn Gas Department. [p. 169.]

**Gas Globes.**
Salford Corporation. [p. 169.]

**Lamps and Columns.**
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 169.]

**Meter (Station).**
Prestatyn Gas Department. [p. 169.]

**Paints, Oils, &c.**
Blackpool Corporation. [p. 169.]
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 169.]

**Pipes (Concrete).**
Blackpool Corporation. [p. 169.]

**Purifier Lids.**
Prestatyn Gas Department. [p. 169.]

**Refractory Materials.**
Salford Corporation. [p. 169.]
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 169.]

**Retort Plant.**
Newcastle-under-Lyme Rural District Council. [p. 169.]
Prestatyn Gas Department. [p. 169.]

**Stores (Tools, Belting, &c.).**
Blackpool Corporation. [p. 169.]
Salford Corporation. [p. 169.]
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 169.]

**Valves, Cocks, &c.**
Prestatyn Gas Department. [p. 169.]
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 169.]

## Trade Notes

### Essex Agency for Calor Gas.

Mr. A. J. Underwood, of 15, Bank Street, Braintree, late Commercial Manager of the Braintree Gas Company, has accepted the appointment as the Calor Gas Agent for the County of Essex, in place of the Independent Gas Company whose agency has been terminated.

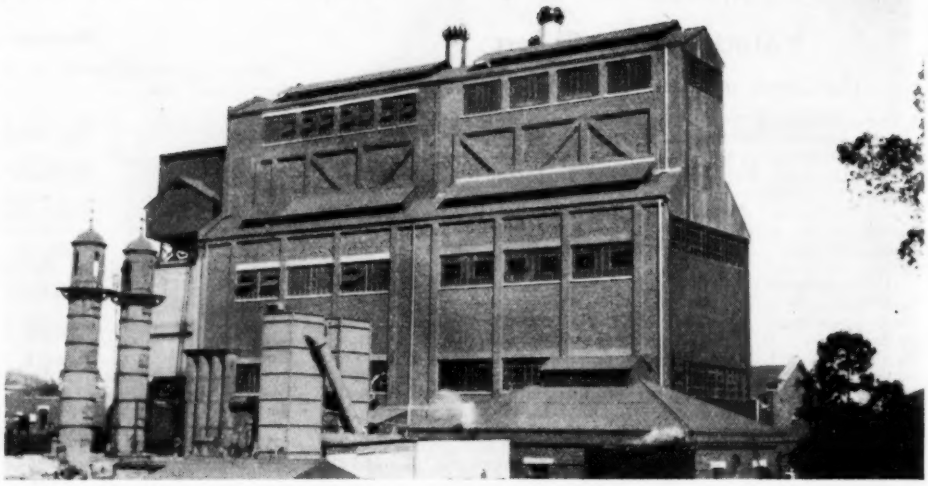
### Overseas Orders for Gasholders.

Clayton, Son, & Co., Ltd., of Leeds, have received an order for a high-pressure gasholder 20 ft. diameter by 60 ft. long over the spherical ends from the Empresas Electricas De Bahia Blanca for their gas-works in South America. This gasholder will be capable of releasing gas up to 50 lb. per sq.in. Clayton, Son, & Co., Ltd., have also in hand a 3-million cu.ft. capacity M.A.N. type waterless gasholder for Australia, which is a repeat order following the 2-million cu.ft. capacity M.A.N. type waterless holder now being erected by them in Australia.

### Quick Delivery Service by Walsall Firm.

The 60-years-old Walsall firm of Messrs. Walker Bros., Ltd., specialists in steel sheeting and hollow-ware, have recently devised a successful scheme for speeding up their home trade deliveries, involving a rapid service of lorries to all parts of the country on regular routes. Large stocks of sheeting of practically every shape, size, and type, galvanized and corrugated roof lights, Italian and Canadian pattern sheets and heavily coated sheets are carried to facilitate immediate execution of orders.

A new picture from South Africa showing (left) the first installation and (right) the second installation of Glover-West vertical retorts built to the order of the Johannesburg Municipal Gas Department at the Cottesloe gas works.



*Practise* **SCIENTIFIC CONTROL** *to the best advantage by adopting the*

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**Glover-West Vertical Retorts • Westvertical Carbonizing Chambers • West Coal and Coke-handling Systems**

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**WEST'S GAS IMPROVEMENT COMPANY, LTD.**

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LONDON: COLUMBIA HOUSE, ALDWYCH, W.C. 2 — 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

# STOCK AND SHARE LIST

## Official Quotations on the London Stock Exchange

| Issue. £ | Stock or Share | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Jan. 10. | Rise or Fall on Week. | Transactions, Lowest and Highest Prices During the Week. |
|---|---|---|---|---|---|---|---|---|
| 1,551,868 | Stk. | Sept. 9 | 7 | 7 | Alliance & Dublin Ord. ... | 133—143 | ... | 140—143½ |
| 374,000 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. ... | 95—100 | ... | ... |
| 557,655 | ,, | Aug. 12 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 165—170 | ... | ... |
| 300,000 | 1 | Oct. 7 | 1 9/32 | 1 4/32 | Bombay, Ltd. ... ... ... | 1 5/16—1 3/8 | ... | 26/- |
| 178,480 | Stk. | Aug. 12 | 9½ | 9½ | Bournemouth sliding scale ... | 222—232 | ... | 225—228 |
| 550,050 | ,, | ,, | 7 | 7 | Do. 7 p.c. max. ... | 171—176 | ... | 174½—175 |
| 489,160 | ,, | ,, | 6 | 6 | Do. 6 p.c. Pref. ... | 150—155 | ... | ... |
| 50,000 | ,, | Dec. 16 | 3 | 3 | Do. 3 p.c. Deb. ... | 82—87 | ... | ... |
| 262,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 103—108 | ... | 108½ |
| 335,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 123—128 | ... | ... |
| 357,900 | ,, | Aug. 12 | 7½ | 7½ | Brighton, &c., 6 p.c. Con. ... | 170—175 | ... | ... |
| 649,955 | ,, | ,, | 6¾ | 6¾ | Do. 5 p.c. Con. ... | 156—161 | ... | ... |
| 205,500 | ,, | ,, | 6 | 6 | Do. 6 p.c. 'B' Pref. | 142—147 | ... | ... |
| 855,000 | ,, | Sept. 23 | 8 | 7 | British Ord. ... ... ... | 152—157 | ... | 153½—154¾ |
| 100,000 | ,, | Dec. 16 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 153—158 | ... | ... |
| 350,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. 'B' Cum. Pref. | 110—115 | ... | ... |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 96—101 | ... | ... |
| 450,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 107—112 | ... | ... |
| 200,000 | ,, | ,, | 17/6§ | 3½ | Do. 3½ p.c. Red. Deb. ... | 98—100 | ... | ... |
| 100,000 | 10 | 22 May '33 | 6 | 4 | Cape Town, Ltd. ... ... | 1—3 | ... | ... |
| 100,000 | 10 | 6 Nov. '33 | 4½ | 4½ | Do. 4½ p.c. Pref. ... | 1—3 | ... | ... |
| 150,000 | Stk. | Jan. 6 | 4½ | 4½ | Do. 4½ p.c. Deb. ... | 81—86* | −2 | ... |
| 626,860 | ,, | July 22 | 6 | 6 | Cardiff Con. Ord. ... ... | 133—138 | ... | ... |
| 98,936 | 1 | Sept. 23 | 2/- | 2 - | Colombo, Ltd., Ord.... ... | 1 3/32—1 5/32 | ... | ... |
| 24,500 | 1 | ,, | 1 4/32 | 1 4/32 | Do. 7 p.c. Pref.... | 20/—22/- | ... | ... |
| 609,204 | 1 | Oct. 7 | -/11·48 | - 11·48 | Colonial Gas Assn. Ltd. Ord. | 19/6—21/6 | ... | ... |
| 296,053 | 1 | ,, | 1/3·30 | 1/3·30 | Do. 8 p.c. Pref. | 24 6—26/6 | ... | ... |
| 1,775,005 | Stk. | Aug. 12 | 6 | 5 | Commercial Ord. ... ... | 100—105 | ... | 103½—105 |
| 620,000 | ,, | Dec. 2 | 3 | 3 | Do. 3 p.c. Deb. ... | 85—90 | ... | ... |
| 286,344 | ,, | Aug. 12 | 5 | 5 | Do. 5 p.c. Deb. ... | 121—126 | ... | ... |
| 807,560 | ,, | Aug. 12 | 7 | 7 | Croydon sliding scale ... | 151—156 | ... | 155 |
| 569,590 | ,, | ,, | 5 | 5 | Do. max. div. ... ... | 113—118 | ... | ... |
| 620,385 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb.... ... | 121—126 | ... | ... |
| 239,000 | ,, | Aug. 12 | 5 | 5 | East Hull Ord. 5 p.c.... ... | 109—112 | ... | ... |
| 181,625 | ,, | Aug. 12 | 6 | 6 | East Surrey Ord. 5 p.c. ... | 132—137 | ... | ... |
| 175,609 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... | 120—125* | ... | ... |
| 19,284,128 | ,, | Aug. 12 | 5½ | 5½ | Gas Light & Coke 4 p.c. Ord. | 27/—28/-a | ... | 27/3—27/7½ |
| 2,600,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. max. ... ... | 88—91 | ... | 91 |
| 4,477,106 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 107—110 | ... | 109—110 |
| 8,602,497 | ,, | Dec. 2 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 89—91 | ... | 89½—91 |
| 3,642,770 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 115—118 | ... | 117—118 |
| 3,500,000 | ,, | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Deb. ... | 113—116 | +2 | 114½—115¾ |
| 270,466 | ,, | Aug. 12 | 6 | 6 | Harrogate New Cons. ... | 132—137 | ... | ... |
| 140,000 | 1 | Sept. 23 | 1/7½ | 1/7½ | Hongkong & China, Ltd. ... | 1—1½ | ... | ... |
| 213,200 | Stk. | Aug. 12 | 6 | 6 | Hornsey Con. 3½ p.c. ... | 130—135 | ... | ... |
| 5,600,000 | ,, | Nov. 4 | 14 | 8 | Imperial Continental Cap. ... | 185—190 | +1 | 187—189 |
| 223,130 | ,, | July 22 | 3½ | 3½ | Do. 3½ p.c. Red. Debs. | 92—97 | ... | ... |
| 285,242 | ,, | Aug. 12 | 8½ | 8½ | Lea Bridge 5 p.c. Ord. ... | 175—180 | ... | ... |
| 165,736 | ,, | Aug. 26 | 10 | 8 | Maidstone 5 p.c. Cap. ... | 182—192 | ... | ... |
| 63,480 | ,, | Dec. 16 | 3 | 3 | Do. 3 p.c. Deb. ... | 79—84 | ... | ... |
| 75,000 | ,, | Dec. 2 | 110 | 110 | Malta & Mediterranean ... | 200—210 | ... | 205 |
| 392,000 | — | Oct. 1 | 5½ | 5½ | Metropolitan (of Melbourne) 5½ p.c. Red. Deb. ... ... | 98—103 | ... | ... |
| 231,978 | Stk. | Aug. 12 | 5 | 5 | M.S. Utility 'C' Cons. ... | 108—113 | ... | ... |
| 818,657 | ,, | ,, | 4 | 4 | Do. 4 p.c. Cons. Pref. | 100—105 | ... | ... |
| 360,075 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. ... | 101—106 | ... | ... |
| 148,955 | ,, | ,, | 5 | 15 | Do. 5 p.c. Deb. ... | 120—125 | ... | ... |
| 125,000 | — | Jan. 2 | 3½ | 3½ | Do. 3½ p.c. Rd. Rg. Bds. | 96—99 | ... | ... |
| 675,000 | Stk. | Nov. 18 | †13 | 13 | Montevideo, Ltd. ... ... | 48—53 | ... | 51 |
| 225,000 | ,, | Aug. 12 | 7½ | 7½ | North Middlesex 6 p.c. Con. | 170—175 | ... | ... |
| 396,160 | ,, | Aug. 12 | 5 | 5 | Northampton 5 p.c. max. ... | 105—110 | ... | ... |
| 300,000 | ,, | Nov. 4 | 17 | 19 | Oriental, Ltd.... ... ... | 163—168 | ... | 167—168 |
| 416,617 | ,, | Dec. 16 | 8 | 8 | Plymouth & Stonehouse 5 p.c. | 159—164 | ... | ... |
| 504,416 | ,, | Aug. 12 | 8½ | 8½ | Portsm'th Con. Stk. 4 p.c. Std. | 173—178 | ... | ... |
| 241,446 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... | 110—115 | ... | ... |
| 114,000 | ,, | July 22 | 5 | 5 | Preston 5 p.c. Pref. ... ... | 106—111 | ... | ... |
| 321,961 | 1 | Sept. 23 | ... | 1/- | Severn Val. Gas Cor. Ld. Ord. | 22/—23/- | ... | 22/6 |
| 319,510 | 1 | ,, | ... | -/10½ | ,, ,, 4½ p.c. Cum. Pref. | 21 9—22 9 | ... | 22/1½—22/3 |
| 133,201 | Stk. | Aug. 12 | 5 | 8½ | Shrewsbury 5 p.c. Ord. ... | 147—152 | ... | ... |
| 90,000 | 10 | May 27 | 13 | 13 | South African... ... ... | 3—4 | ... | ... |
| 1,061,779 | 1 | Sept. 23 | 1 2/7 | 1 2/7 | South East'n Gas Cn. Ld. Ord. | 27/6—28 6 | ... | 28/- |
| 845,016 | 1 | ,, | -/10½ | -/10½ | Do. 4½ p.c. Red. Cum. Pref. | 22 3—23 3 | ... | 23/- |
| 450,000 | Stk. | Aug. 12 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 100—103 | ... | ... |
| 6,709,895 | ,, | Aug. 12 | 6½ | 5 | South Met. Ord. ... ... | 131—136 | ... | 133—135 |
| 1,135,812 | ,, | ,, | 6 | 6 | Do. 6 p.c. Irred. Pf.... | 147—152 | ... | 150—152 |
| 850,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Irred. Pf.... | 105—109 | ... | ... |
| 1,895,445 | ,, | Dec. 16 | 3 | 3 | Do. 3 p.c. Deb. ... | 87—90 | ... | 88—89½ |
| 1,000,000 | ,, | Jan. 6 | 5 | 5 | Do. 5 p.c. Red. Deb. | 113—116* | −2 | ... |
| 1,543,795 | ,, | Aug. 12 | 6 | 6 | South Suburban Ord. 5 p.c.... | 129—134 | ... | 132½—133 |
| 512,825 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref.... | 121—126 | ... | ... |
| 500,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref.... | 103—108 | ... | 106 |
| 888,587 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb.... | 123—128 | +3 | 124 |
| 250,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb.... | 103—108* | ... | ... |
| 415,907 | ,, | Dec. 2 | ... | 4 | S. Western Gas & Water Ord. | 22/6—24/6 | ... | ... |
| 160,523 | ,, | Oct. 21 | ... | ... | Do. 4½% Red. Cum. Pref. | 22 —23 | ... | ... |
| 110,000 | ,, | Dec. 16 | 4 | 4 | Do. 4% Red. Deb. ... | 98—103 | ... | ... |
| 647,740 | ,, | Aug. 12 | 5 | 5 | Southampt'n Ord. 5 p.c. max. | 115—120 | ... | ... |
| 121,275 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. | 98—103 | ... | ... |
| 350,000 | ,, | Aug. 12 | 5½ | 5½ | Swansea 5½ p.c. Red. Pref. ... | 112—117 | ... | 117¾ |
| 200,000 | ,, | Dec. 16 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. ... | 96—101 | ... | 99½ |
| 94,000 | ,, | ... | ... | ... | Do. 3½ p.c. Red. Deb. ... | 96—101 | ... | ... |
| 1,076,490 | ,, | Aug. 12 | 6¾ | 6¾ | Tottenham and District Ord. | 149—154 | ... | 152—152½ |
| 409,835 | ,, | ,, | 5¾ | 5¾ | Do. 5½ p.c. Pref.... | 130—135 | ... | 132 |
| 62,235 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 120—125 | ... | 121 |
| 334,615 | ,, | Dec. 2 | 4 | 4 | Do. 4 p.c. Deb. ... | 100—105 | ... | ... |
| 369,774 | ,, | Aug. 12 | 7 | 7 | Uxbridge, &c., 5 p.c. ... | 152—157 | ... | 155 |
| 108,330 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 117—122 | ... | ... |
| 1,340,521 | ,, | Aug. 12 | 7 | 7 | Wandsworth Consolidated ... | 159—164 | ... | 162½ |
| 1,371,373 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 122—127 | +1 | 124½ |
| 1,317,964 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... | 123—128 | +2 | ... |
| 338,300 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 102—107* | ... | ... |
| 499,735 | ,, | July 8 | 6¾ | 6¾ | Watford and St. Albans Ord. | 153—158 | +2 | 153½—157 |
| 200,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 120—125 | ... | ... |
| 200,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. ... | 135—140 | ... | ... |
| 200,000 | ,, | Dec. 2 | 4 | 4 | Do. 4 p.c. Red. Deb. | 98—103 | ... | 98½ |
| 100,000 | ,, | ,, | ... | 3½ | Do. 3½ p.c. Red. Deb. | 96—101 | ... | ... |
| 158,400 | ,, | Aug. 12 | 6b | 5 | Winchester W. & G. 5 p.c. Con. | 114—119 | ... | ... |

a.—The quotation is per £1 of Stock. b.—Paid £3, including 10s. on account of back dividends. * Ex d v.
† Paid free of income-tax. ‡ For year. § Actual for three months.

**Stock and Share List continued overleaf.**

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# STOCK AND SHARE LIST—Cont.

## Stocks Officially Quoted on Provincial Exchanges

| Issue. £ | Stock or Share | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations. Jan. 10. | Rise or Fall on Week. | Transactions, Lowest and Highest During the Week. |
|---|---|---|---|---|---|---|---|---|
| **BRISTOL EXCHANGE.** | | | | | | | | |
| 347,756 | Stk. | July 22 | 6 | 5 | Bath Cons. ... ... ... | 123—125 | +1 | ... |
| 1,667,250 | ,, | July 8 | 5 | 5 | Bristol, 5 p.c. max. ... ... | 118—120 | ... | ... |
| 120,420 | ,, | Dec. 16 | 4 | 4 | Do. 1st 4 p.c. Deb. ... | 102—104 | +1½ | ... |
| 217,870 | ,, | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 102—104 | +2 | ... |
| 328,790 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 125—128 | ... | ... |
| 274,000 | ,, | Aug. 12 | 5 | 5 | Newport (Mon.) 5 p.c. max.... | 113—118 | ... | ... |
| 13,200 | 12 | Aug. 26 | 8½ | 7 | Pontyp'l Gas & W. 10 p.c. 'A.' | 14½—15½ | ... | ... |
| 13,600 | 10 | ,, | 6 | 5 | Do. 7 p.c. 'B.' | 11½—12½ | ... | ... |
| 40,000 | 10 | ,, | 6 | 5 | Do. 7 p.c. 'C.' | 11½—12½ | ... | ... |
| 140,778 | Stk. | Aug. 12 | 5 | 5 | Weston-super-Mare Cons. ... | 115—117 | ... | ... |
| 64,338 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. | 96—98 | ... | ... |
| 33,340 | ,, | ,, | 7½ | 7½ | Do. 7½ p.c. Deb. | 165—169 | ... | ... |
| **LIVERPOOL EXCHANGE.** | | | | | | | | |
| 157,150 | Stk. | Aug. 12 | 6½ | 5 | Chester 5 p.c. Ord. ... ... | 109—114 | ... | ... |
| 92,500 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Pref. ... ... | 100—105 | ... | ... |
| 32,540 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. Deb. ... | 91—96 | ... | 94½ |
| 41,890 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 100—105 | ... | ... |
| 2,167,410 | ,, | Aug. 12 | 6 | 6 | Liverpool 5 p.c. Ord. ... | 135—137 | +2 | 135 |
| 245,500 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Red. Pref. ... | 103—108 | ... | ... |
| 306,083 | ,, | July 8 | 4 | 4 | Do. 4 p.c. Deb. ... | 105—107 | ... | ... |
| 106,280 | ,, | July 22 | 10 | 10 | Preston 'A' 10 p.c. ... | 206—216 | ... | ... |
| 188,219 | ,, | ,, | 7 | 7 | Do. 'B' 7 p.c. ... ... | 142½—152½ | ... | ... |
| **NEWCASTLE EXCHANGE.** | | | | | | | | |
| 122,577 | Stk. | Aug. 12 | 8 | 8 | Blyth 5 p.c. Ord. ... ... | 151—153 | ... | ... |
| 732,000 | ,, | Aug. 12 | 5 | 5 | Hartlepool G. & W. Cn. & New | 118—120 | ... | ... |
| 2,061,315 | ,, | Aug. 12 | 5½ | 5 | Newcastle & Gateshead Con. | 25/3—25/9a | +-/3 | ... |
| 682,856 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. ... | 107—108 | ... | ... |
| 776,706 | ,, | Dec. 16 | 3½ | 3½ | Do. 3½ p.c. Deb. ... | 100—102 | ... | ... |
| 277,285 | ,, | Oct. 21 | 5 | 5 | Do. 5 p.c. Deb. '43... | 105—106 | ... | ... |
| 209,820 | ,, | Aug. 12 | 8½ | 8½ | South Shields Con. ... ... | 173—175 | +2 | ... |
| 299,542 | ,, | Aug. 12 | 6 | 6 | Sunderland 6 p.c. max. ... | 129—131 | ... | ... |
| **NOTTINGHAM EXCHANGE.** | | | | | | | | |
| 542,270 | Stk. | Aug. 12 | 10 | 7 | Derby Con. ... ... ... | 175—185 | ... | ... |
| 55,000 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—105 | ... | ... |
| 64,750 | ,, | Aug. 26 | 12 | 5 | Long Eaton 'A' Ord. ... | 150—160 | ... | ... |
| 50,000 | ,, | ,, | 10 | 4 | Do. 'B' Ord. ... | 130—140 | ... | ... |
| 20,000 | 10 | June 7 | 5 | 5 | Do. 5 p.c. Pref. ... | 10—12 | ... | ... |
| 80,000 | Stk. | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 117—122 | ... | ... |
| **SHEFFIELD EXCHANGE.** | | | | | | | | |
| 10,000 | Stk. | Aug. 26 | 10 | 10 | Great Grimsby 'A' Ord. ... | 220—230 | ... | ... |
| 6,500 | ,, | ,, | 10 | 10 | Do. 'B' Ord. ... | 220—230 | ... | ... |
| 79,000 | ,, | ,, | 10 | 10 | Do. 'C' Ord. ... | 205—215 | ... | ... |
| 1,736,968 | ,, | Aug. 26 | 6 | 6 | Sheffield Cons. ... ... | 142—143 | +1⅛ | ... |
| 95,000 | ,, | Dec. 16 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100½—102½ | ... | ... |

a The quotation is per £1 of Stock.

## Supplementary List of Stocks and Shares not Officially Quoted

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60,000 | 10 | Sept. 9 | 10 | 10 | Ascot 10 p.c. max. ... ... | 22—24 | ... | ... |
| 58,680 | 10 | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 14½—15½ | ... | ... |
| 90,000 | 1 | Nov. 4 | 5 | 5 | Assd. Gas and Water Ord.... | 21/—23/- | ... | ... |
| 90,000 | 1 | ,, | 4½ | 4½ | Do. 4½ p.c. Cum. Pref. ... | 21/9—22/9 | ... | ... |
| 17,000 | Stk | Aug. 26 | 8 | 8 | Bognor Orig. Ord. 'A' ... | 164—174 | ... | ... |
| 62,210 | ,, | ,, | 8 | 8 | Do. New Addl. 'A' ... | 164—174 | ... | ... |
| 87,160 | ,, | ,, | 7 | 7 | Do. New 7 p.c. max. ... | 142—147 | ... | ... |
| 37,440 | ,, | July 22 | 10 | 10 | Cam.Univ. & Town 10 p.c.max. | 214—224 | ... | ... |
| 125,970 | ,, | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 161—166 | ... | ... |
| 39,025 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 110—115 | ... | ... |
| 65,000 | ,, | Aug. 12 | 8½ | 7½ | Eastbourne 'A' 5 p.c. ... | 153—158 | ... | 154½ |
| 198,000 | ,, | ,, | 7 | 6 | Do. 'B' 3½ p.c. ... ... | 135—140 | ... | ... |
| 112,312 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 120—125 | ... | ... |
| 130,000 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 122—127 | ... | ... |
| 250,000 | 1 | Nov. 18 | ... | 4 | Gas Consolidation Ord. ... | 20/6—22/6 | ... | ... |
| 250,000 | 1 | ,, | ... | 4 | Do. 4 p.c. Red. Cum. Pref. | 19/6—20/6 | ... | 19/9—19/10½ |
| 117,251 | Stk. | Sept. 23 | 8 1/10 | 8 1/10 | Gosport District Cons. ... | 177—182 | ... | ... |
| 73,350 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 113—118 | ... | ... |
| 24,000 | 30 | Aug. 12 | 8½ | 8½ | Great Yarmouth 8½ p.c. max. | 53—58 | ... | ... |
| 59,400 | 30 | ,, | 7½ | 7½ | Do. 7½ p.c. max.... ... | 43—46 | ... | ... |
| 51,160 | Stk. | Dec. 2 | 5½ | 5½ | Do. 5½ p.c. Deb.... ... | 173—178 | ... | ... |
| 152,600 | ,, | Aug. 26 | 8 | 8 | Guildford Cons. ... ... | 170—175 | ... | ... |
| 54,055 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 116—121 | ... | ... |
| 68,250 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 120—125 | ... | ... |
| 156,600 | ,, | Aug. 12 | 7½ | 7½ | Hampton Court Cons. ... | 170—180 | ... | ... |
| 81,660 | 10 | Feb. 4 | 9 | 9 | Leatherhead Ord. ... ... | 16—17 | ... | ... |
| 107,960 | 10 | Sept. 23 | 5 | 4 | Mid Kent Ord. ... ... | 9½—10½ | ... | ... |
| 230,445 | Stk. | Aug. 12 | 10 | 10 | Oxford & District Ord. ... | 215—225 | ... | ... |
| 47,112 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 117—122 | ... | ... |
| 50,000 | ,, | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 115—120 | ... | ... |
| 126,193 | ,, | Nov. 18 | 7½ | 7½ | Peterborough Ord. ... ... | 160—170 | ... | 168½—169 |
| 64,990 | ,, | Sept. 9 | 7½ | 6½ | Redditch Ord. ... ... | 116—121 | ... | ... |
| 66,850 | ,, | Aug. 12 | 7 | 7 | Romford Ord. ... ... | 167—172 | ... | ... |
| 160,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 97—100 | ... | ... |
| 44,000 | ,, | Sept. 23 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 121—126 | ... | ... |
| 10,950 | ,, | Aug. 26 | 8 | 8 | Ryde Ord. ... ... | 168—173 | ... | ... |
| 136,191 | ,, | July 22 | 7 | 5 | Scarborough Ord. ... ... | 130—140 | ... | ... |
| 277,825 | ,, | Aug. 26 | 8 | 8 | Shanklin & Ventnor Cons. ... | 155—165 | ... | ... |
| 40,643 | ,, | Sept. 23 | 7 | 7 | Slough Ord. ... ... ... | 150—155 | ... | ... |
| 221,000 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 116—121 | ... | ... |
| 28,872 | 1 | Nov. 4 | 5½ | 5½ | S. Midland Gas Cpn.Ltd. Ord. | 20/—22/- | ... | ... |
| 28,866 | 1 | Sept. 9 | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 20/—22/- | ... | ... |
| 24,930 | Stk. | Aug. 12 | 7 | 7 | Southgate & Dist. 7 p.c. max. | 150—155 | ... | ... |
| 162,500 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 117—122 | ... | ... |
| 17,228 | ,, | Aug. 12 | 6 | 5 | Swindon Cons. ... ... | 113—118 | ... | ... |
| 160,425 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 120—125 | ... | ... |
| 50,000 | 1 | ,, | ... | ... | Utd. Kingdom Gas Cpn. Ord. | 1⅛—1⅜ | ... | 22/- |
| 760,910 | 1 | Nov. 18 | ... | 2½ | Do. 4½ p.c. Prefd. Ord.... | 19/6—20/6 | ... | ... |
| 110,910 | 1 | ,, | ... | 2½ | Do. 4½ p.c. Cum. Pref. ... | 20/6—21/6 | ... | 20/7½—21/- |
| 900,000 | Stk. | ,, | ... | ... | Do. 3½ p.c. Red. Deb. ... | 98—101 | ... | ... |
| 430,000 | ,, | Aug. 12 | 8 | 5 | Wakefield Ord. ... ... | 140—150 | ... | ... |
| 181,650 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 103—108 | ... | ... |
| 82,000 | ,, | July 22 | 6 | 6 | Weymouth Ord. ... ... | 108—113 | +7 | ... |
| 70,000 | ,, | ,, | 6 | 4 | York Cons. ... ... ... | 107—112 | ... | ... |
| 390,000 | ,, | Dec. 16 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 103—108 | ... | ... |
| 33,640 | ,, | Aug. 12 | 6½ | 6½ | Yorktown (Cam.) 5 p.c. Cons. | 120—125 | ... | ... |
| 100,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 117—122 | ... | ... |
| 135,000 | ,, | Dec. 16 | 5½ | 5 | Do. 5½ p.c. Deb.... ... | 126—131 | ... | ... |

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